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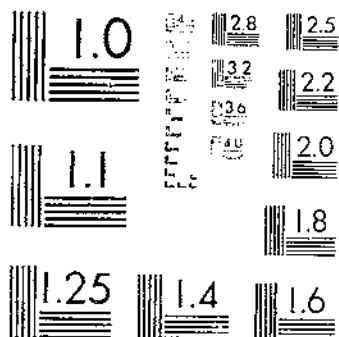
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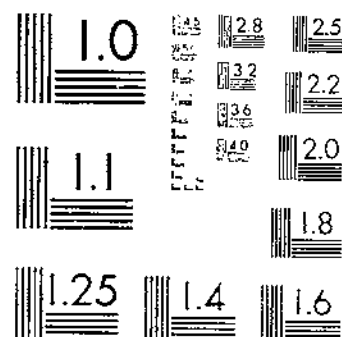
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WHEAT REQUIREMENTS IN EUROPE (ESPECIALLY PERTAINING TO QUALITY AND TYPE
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WHEAT REQUIREMENTS IN EUROPE

(Especially pertaining to Quality and Type, and
to Milling and Baking Practices)

By

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INTRODUCTION

Europe has been for centuries the world's greatest consuming center for wheat. The inability of most of the countries in that part of the world to produce wheat in sufficient quantity or of satisfactory quality to fulfill domestic requirements has been the main incentive for the increase in production of wheat in the New World. Moreover, the revenue derived from this trade has been an important factor in the prosperity and development of the export countries which have supplied this trade in past years. To continue to derive benefit from this trade, these countries must keep their production in step with demand as regards both quality and quantity.

¹ Exclusive of the Union of Soviet Socialist Republics

² Credit is due Hally H. Conrad for preparation of tables of wheat and rye statistics in European countries and Caroline G. Gries for preparation of tables of United States trade statistics.

To do this, it will be necessary to anticipate future requirements and trade possibilities, but first there must be available much information concerning a number of subjects, some of which may have only an indirect relationship to import requirements. It is with the presentation of such information that this bulletin is chiefly concerned. The descriptive information presented in the following pages is based largely on field investigations made in Europe by the author during the period from June 1931 to June 1934.

CONCERN OF UNITED STATES IN EUROPEAN WHEAT REQUIREMENTS

In the past the wheat deficits occurring in European countries have had to be made up by importations from the United States and other surplus-producing countries. Countries in other parts of the world that were deficient in wheat production have also provided a market for some wheat from the United States, but of the total quantity of wheat exported from this country, European countries have taken the major portion (figs. 1, 2, and 3).

The United States produces wheat of all the various types needed for use in the wheat-importing countries throughout the world, and of many of these types it has had, until recent years, a surplus over its own requirements (table 1). In the nineteenth century this country had in Europe a market for all the wheat it had to spare. In the crop year 1898-99 wheat and wheat-flour exports from the United States, a great preponderance of which went to Europe, amounted to 227,240,000 bushels. The early years of the twentieth century saw a considerable decline in this trade and by 1911-12 it had dropped to 81,891,000 bushels, of which 44,240,000 went to Europe. The World War of 1914-18 greatly changed this situation, as evidenced by the fact that during the 4 years of the war annual exports of wheat and wheat flour from the United States averaged slightly in excess of 230,000,000 bushels, of which 196,000,000 bushels went to European countries. During the 5 crop years (1919-23) which followed, average annual exports continued at about the same level.

TABLE 1.—United States exports of wheat, by classes, 1920-21 to 1934-35

Year beginning July 1-	Hard red spring	Durum	Hard red winter	Soft red winter	White	Total
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1920..	18,421	31,937	162,544	59,206	21,070	293,268
1921..	25,613	25,645	109,661	29,274	28,138	208,331
1922..	13,975	43,188	61,165	22,770	13,853	154,951
1923..	2,068	18,836	26,984	10,464	20,441	78,793
1924..	21,537	33,816	120,573	8,333	11,201	195,490
1925..	4,958	26,831	9,677	2,563	19,157	63,189
1926..	2,174	21,970	73,123	31,352	27,631	156,250
1927..	6,000	26,500	60,300	12,800	30,400	146,000
1928..	2,200	47,500	35,000	3,000	15,400	103,100
1929..	1,000	14,800	51,400	2,700	18,400	92,200
1930..	600	12,100	47,300	2,600	13,700	76,300
1931..	100	4,700	75,500	2,200	14,000	96,500
1932..		1,700	17,000		2,200	20,900
1933..			1,400		17,400	18,800
1934..			170	10	2,839	3,019

Division of Statistical and Historical Research. Computed from total exports by customs districts on the basis of inspections of wheat for export by ports and classes in the United States and Canadian Eastern Grain Division.

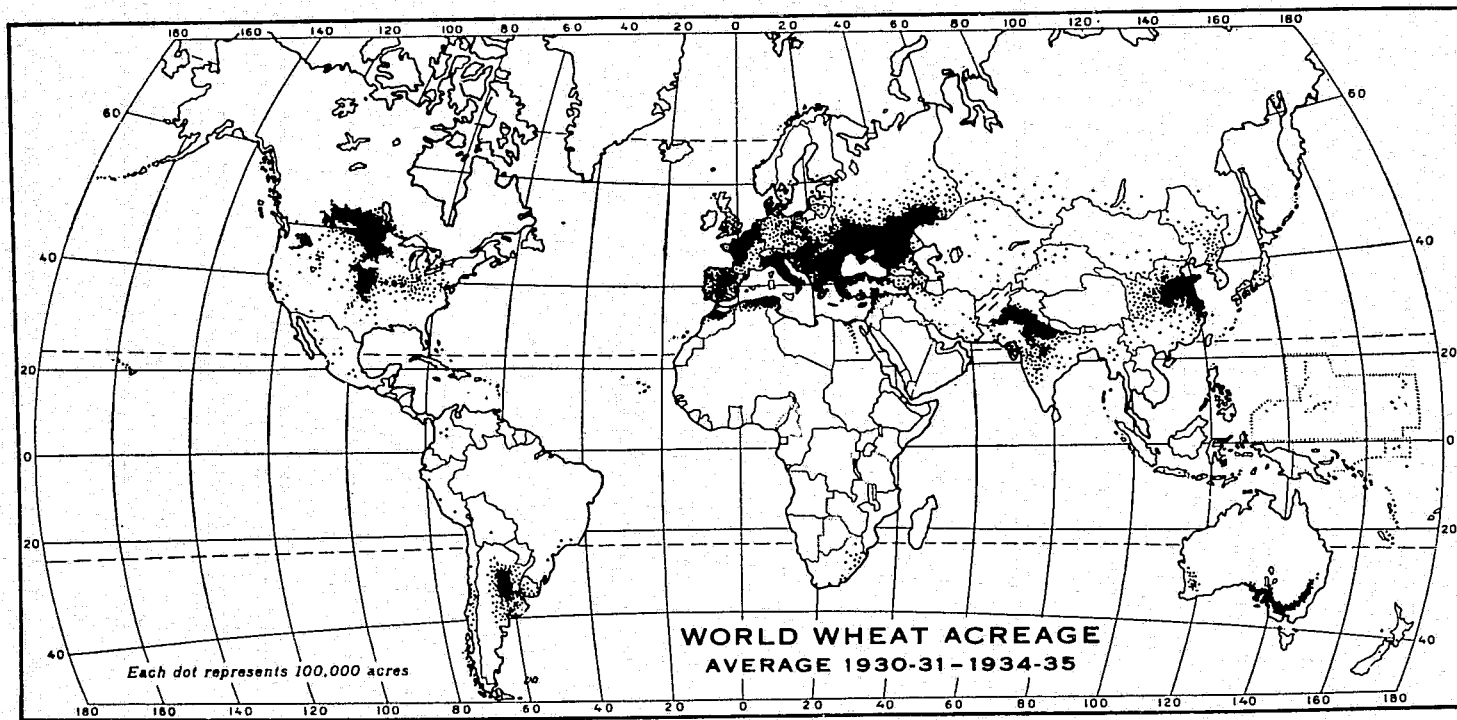


FIGURE 1.—The wheat acreage of the world lies almost wholly in the temperate zones; much the greater share of it lies in the North Temperate Zone.

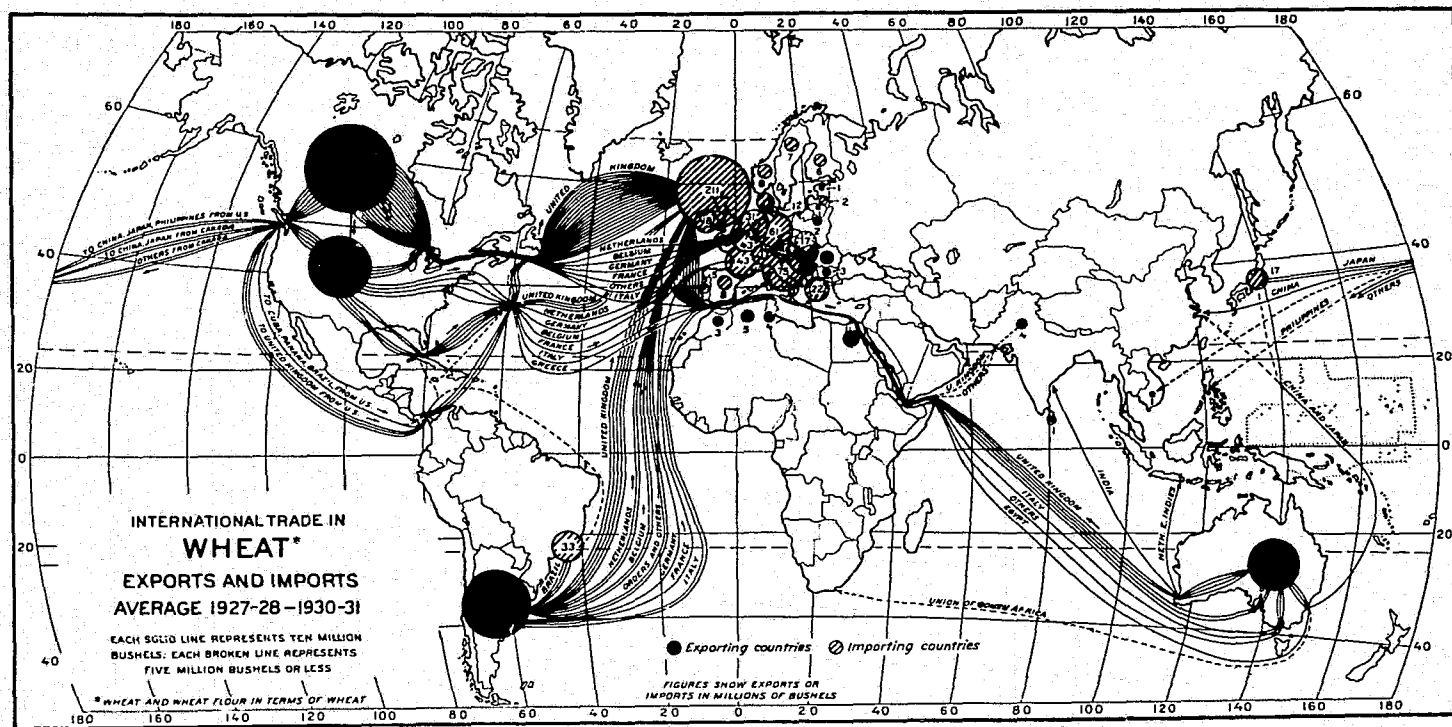


FIGURE 2.—The principal wheat-exporting countries of the world were Canada, Argentina, United States, Australia, and the Union of Soviet Socialist Republics, at the time this map was prepared, and the principal importing area was western Europe. In recent years the United States has not been one of the principal exporting countries. (The Union of Soviet Socialist Republics' exports during the 1930-31 crop year totaled 111,000,000 bushels. Trade estimates place Australian shipments to oriental destinations, crop season 1930-31, around 50,000,000 bushels.)

Since then, however, exports have declined rapidly, falling in the year 1934-35 to 21,000,000 bushels. For additional statistical

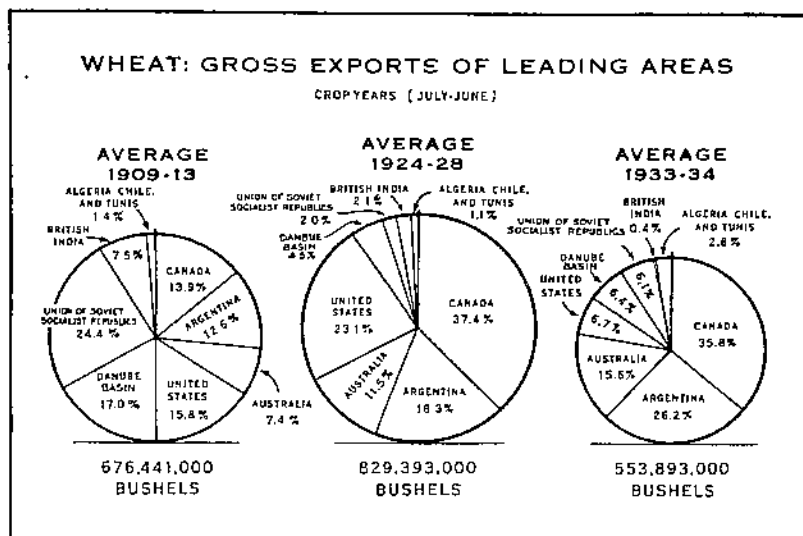


FIGURE 3.—Average exports of wheat (including flour) during the 1924-28 period were more than one-fifth greater than during the 1909-13 period, whereas in the crop year 1933-34 they were nearly one-fifth less. The Union of Soviet Socialist Republics and the Danube Basin were the leading exporting areas during 1909-13, and Canada and the United States were the leading exporting countries during the 1924-28 period. In 1933-34 Canada and Argentina held this distinction.

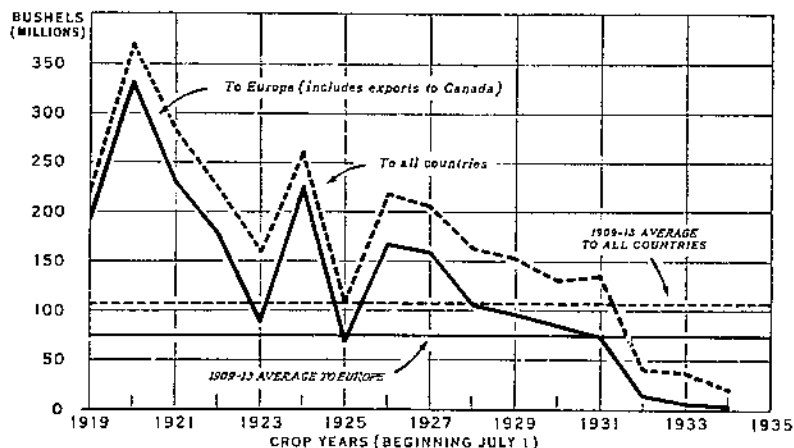


FIGURE 4.—WHEAT (INCLUDING FLOUR) EXPORTS FROM THE UNITED STATES TO EUROPE AND TO ALL COUNTRIES, AVERAGE 1909-13, ANNUAL 1919-34.

Since 1920 exports have declined from a total of 370,000,000 bushels per year to about 21,000,000 bushels. During the years of high exports, all except a very small percentage went to Europe.

information regarding United States exports of wheat and flour, see tables 2 and 3, and figure 4.

TABLE 2.—Exports of wheat from the United States by countries, average and annual for specified crops, 1900-1901 to 1934-35

Country to which exported	Average for years beginning July 1					Annual for year beginning July 1					
	1900-1904	1900-13	1914-18	1919-23	1924-28	1929	1930	1931	1932	1933	1934
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
United Kingdom.....	46,241	21,806	53,743	44,486	29,694	23,931	17,863	15,112	1,558	1,001	325
Greece.....	0	62	5,073	1,200	3,694	7,009	3,370	11,140	3,149	0	0
Belgium.....	8,442	7,195	8,536	14,582	8,087	6,314	7,304	10,707	2,372	171	48
Netherlands.....	8,857	8,351	15,162	11,456	10,857	6,197	6,943	8,681	7,009	99	21
France.....	1,672	3,002	21,014	14,884	7,765	2,214	7,859	6,148	1,121	38	58
Germany.....	10,435	6,155	530	11,605	4,841	4,769	1,722	3,530	263	0	30
Italy.....	332	2,367	26,351	32,320	10,901	905	3,675	1,441	398	0	120
Irish Free State.....	(1)	(1)	(1)	(1)	2,652	3,018	2,146	887	1,065	2,328	857
Denmark.....	1,287	561	1,113	127	428	254	44	40	0	18	0
Norway.....	(2)	44	1,703	563	363	80	206	19	0	0	0
Finland.....	0	0	0	12	20	(1)	0	99	19	0	0
Sweden.....	354	54	2,853	560	546	150	32	88	40	0	0
Malta, Gozo, and Cyprus.....	(1)	120	343	168	184	214	12	0	0	0	0
Other Europe.....	2,025	769	8,189	6,044	2,431	1,615	637	327	0	0	0
Total Europe.....	79,645	50,486	144,610	138,097	82,463	56,679	51,972	58,228	10,685	3,655	1,459
Canada.....	4,183	1,776	11,472	10,683	38,023	\$ 16,777	\$ 12,493	\$ 5,709	\$ 492	\$ 17	\$ 3
Cuba.....	(1)	29	77	27	59	48	36	21	24	32	6
Panama.....	0	2	143	458	2,617	5,589	3,571	871	(1)	(1)	295
Haiti.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	0
Mexico.....	552	1,179	75	1,570	1,491	2,629	1,541	7	32	31	7
Brazil.....	(1)	1	537	899	624	(1)	883	14,703	9,016	0	0
Peru.....	403	162	332	368	603	0	135	75	2	183	0
Colombia.....	(1)	233	160	74	261	310	98	78	16	3	1
China.....	0	10	(1)	2,860	546	140	1,872	14,350	0	9,839	887
Hong Kong.....	39	8	(1)	3	(1)	16	8	18	12	11	2
Kwantung.....	0	0	0	0	1	0	0	0	0	0	0
Japan.....	296	2,338	155	5,566	5,340	9,169	3,063	1,646	118	4,840	192
Philippines.....	1	(1)	(1)	1	7	0	(1)	0	(1)	(1)	0
Other countries.....	4,826	689	1,329	1,927	773	\$18	693	725	490	189	167
Total exports.....	89,945	56,913	159,090	171,553	132,808	92,175	76,365	96,521	20,887	18,800	3,019
Total imports ¹	981	1,256	13,913	23,100	14,428	12,948	19,654	12,885	9,379	11,490	25,116
Total reexports.....	495	193	473	210	99	60	15	863	452	(1)	-----
Net exports.....	89,450	55,876	145,650	148,654	118,479	79,287	57,326	84,499	11,960	7,310	\$ 22,097

¹ Reported in statistics for the United Kingdom.² Included with Sweden.³ Includes Norway.⁴ Less than 500.⁵ Exports of wheat to Canada are usually reexported to Europe.⁶ Imports for consumption beginning Jan. 1, 1934; previous years general imports.⁷ July 1 to Dec. 31, 1933, only; less than 500 bushels.⁸ Net imports.

Foreign Agricultural Service Division. Compiled from Foreign Commerce and Navigation of the United States and official records of the Bureau of Foreign and Domestic Commerce.

TABLE 3.—Exports of wheat flour from the United States, by countries, average and annual for specified crops, 1900-1901 to 1934-35

Country to which exported	Average for years beginning July 1					Annual for year beginning July 1					
	1900-1901	1909-13	1914-18	1919-23	1924-28	1929	1930	1931	1932	1933	1934
	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>
United Kingdom.....	8,175,858	2,712,639	6,253,840	2,877,909	1,361,577	1,560,437	1,378,259	774,696	90,629	69,269	57,176
Greece.....	2	1,083	275,974	268,996	254,981	30,460	12,322	6,743	770	5,101	13,781
Belgium.....	56,677	12,624	427,778	398,153	46,513	12,892	56,929	13,418	8,353	6,020	4,144
Netherlands.....	1,033,272	818,637	744,581	1,024,465	1,347,455	1,030,913	1,297,105	175,682	138,131	83,234	92,432
France.....	3,814	6,918	3,058,928	574,089	5,786	3,723	6,184	6,523	2,070	4,443	5,191
Germany.....	592,111	187,457	1,648	1,260,714	803,086	451,718	213,054	144,799	24,782	15,013	20,923
Italy.....	2,649	11,250	1,590,728	611,554	30,038	38,853	60,659	48,088	50,742	61,732	4,540
Irish Free State.....	(1)	(1)	(1)	(1)	54,758	145,114	151,553	117,370	68,553	51,236	37,233
Denmark.....	139,020	244,417	224,637	196,909	364,070	535,185	508,090	283,859	52,801	30,929	23,533
Norway.....	75,377	212,713	599,173	199,659	256,873	363,463	312,781	272,720	177,063	123,849	132,350
Finland.....	0	243,856	7,118	496,089	432,318	340,687	282,288	139,173	26,732	19,064	13,473
Sweden.....	88,837	43,406	46,319	142,480	78,684	100,303	24,258	10,411	3,025	3,267	5,613
Malta, Gozo, and Cyprus.....	28,369	8,237	2,912	38,606	31,384	30,224	32,120	28,685	20,160	22,331	21,415
Other Europe.....	146,148	102,064	638,536	1,976,308	170,258	87,132	132,692	16,279	15,415	14,853	8,739
Total Europe.....	10,312,134	4,605,301	13,872,172	10,011,931	5,237,781	4,740,104	4,501,294	2,038,396	688,220	519,344	440,543
Canada.....	98,774	82,821	71,102	60,265	71,454	117,113	61,957	31,767	6,878	3,277	4,101
Cuba.....	589,237	856,239	960,789	1,171,190	1,199,073	1,198,688	968,110	870,740	737,529	809,300	931,067
Panama.....	12,984	132,559	116,476	94,670	99,324	120,050	130,408	123,377	118,054	118,939	122,049
Haiti.....	95,425	233,932	122,204	285,738	301,637	210,545	232,333	239,773	124,847	124,847	119,362
Mexico.....	51,011	31,314	521,876	345,509	154,826	109,976	32,924	8,346	4,052	8,671	16,736
Brazil.....	493,032	567,444	375,522	467,653	832,220	779,819	670,979	112,509	61,018	196,588	126,277
Peru.....	56,840	120,144	77,477	74,454	93,228	97,269	81,360	52,024	12,887	20,268	18,970
Colombia.....	85,291	24,548	17,147	38,456	105,015	123,173	98,499	29,506	2,613	3,188	6,115
China.....	83,462	263,882	6,825	944,190	613,759	553,485	1,000,293	1,740,337	132,929	31,654	347,126
Hong Kong.....	1,280,745	1,121,139	209,559	690,757	647,135	751,623	843,246	679,644	427,016	215,623	129,830
Kwantung.....	0	32,060	1	333,017	212,466	891,025	331,792	95,801	30,250	44,775	10,500
Japan.....	872,069	614,117	26,734	244,635	144,250	38,558	30,279	1,232	3,220	886	5,555
Philippines.....	12,101	278,717	154,368	336,933	676,019	729,629	640,265	630,157	561,550	491,066	356,717
Other countries.....	2,377,382	1,714,418	1,409,375	2,063,417	2,207,029	2,417,868	2,040,561	1,670,763	1,402,751	1,284,337	1,303,939
Total exports.....	16,390,487	10,678,635	17,941,627	17,152,815	12,524,491	12,993,617	11,725,579	8,356,509	4,324,107	3,872,763	3,938,917
Total imports.....	17,863	128,517	256,209	559,520	7,702	1,703	1,162	272	681	2,825	3,840
Total reexports.....	11,431	495	18,853	33,042	5,055	2,677	907	220	667	30	-----
Net exports.....	16,384,055	10,550,613	17,704,271	16,627,237	12,521,844	12,994,591	11,725,324	8,356,427	4,324,093	3,871,938	3,935,077

¹ Included with the United Kingdom.² Imports for consumption beginning Jan. 1, 1934.³ 6 months, July-December.

Foreign Agricultural Service Division. Compiled from Foreign Commerce and Navigation of the United States and official records of the Bureau of Foreign and Domestic Commerce.

REQUIREMENT SITUATION FOR EUROPE AS A WHOLE

GENERAL CHARACTERISTICS OF EUROPEAN WHEATS

European wheats are generally of weak baking quality.³ In most of the countries, particularly those in western Europe, the wheats produced are so weak that unless strong foreign wheats are blended with them they are incapable of producing bread of satisfactory quality. In Germany, Italy, Switzerland, Spain, Austria, and Sweden some fairly strong wheat is produced, but its production is not nearly in proportion to the domestic requirements. The only countries in which the production of strong-quality wheat is sufficient for domestic requirements are the Danubian countries and Union of Soviet Socialist Republics, but in none of them does this wheat predominate over the medium- and weak-quality wheats.

A major portion of the production of wheat is of the red winter sort. Some white wheat is produced but only in the Netherlands, Spain, Italy, and Poland is it any very considerable portion of the total production. Red spring wheats are produced in some of the northern and central European countries, but only in Sweden and one or two of the smaller countries on the northern rim of Europe is the production of any importance. Wherever produced, however, it is usually considered to be superior in quality to other local wheats. Wheat of the durum type is produced in several European countries, but only in Spain, Portugal, Italy, and the Union of Soviet Socialist Republics is its production of any relative importance. The Union of Soviet Socialist Republics is the largest producer of this class of wheat and Italy the second largest. In per-capita consumption of it, Italy leads the world. In the latter country rarely one-fifth of the wheat produced is of the durum species.

Some spelt and emmer are produced in the mountainous sections of central and southern Europe, but not in any great quantity. In most of the countries in which produced, it is used chiefly as animal feed, but in Switzerland and possibly one or two of the other countries much of the crop is used in the manufacture of flour for human consumption.

Wheats of the Poulard and Polish species are grown in a few countries. Spain and Portugal are probably the largest producers of these types, but in neither is a significant quantity produced.

In all the western European countries except Spain and Portugal practically all of the wheat produced is soft or extremely soft in texture. The softest and weakest wheats are grown in the British Isles, the Netherlands, Denmark, and western France. In central Europe the wheats, although soft, are not so notably soft as the western coast-line wheats. These central European wheats are similar to the soft red winter wheats of eastern United States. In other parts of Europe soft-textured wheats also predominate but a considerable portion of the production is of hard or semihard texture.

Except in the eastern countries and Spain, European wheats are usually of high average moisture content, ranging from 15 percent in

³ Wheats that yield flour that will not permit much variation in treatment in the baking or that will not produce bread of good volume and texture of crumb are said to be of weak baking quality. Strong wheats yield a flour capable of producing bread of good volume and texture under a wide variation of baking conditions. Weak wheats are generally of low gluten or protein content and of soft texture. Strong wheats are generally of high gluten or protein content and of hard texture. In areas of moderate temperature and abundant rainfall, the wheats are generally of weak quality; where the summers are hot and dry, the wheats are generally strong in baking quality.

the drier seasons to 17 percent in wet seasons. This characteristic in itself, because of its direct relationship to intrinsic value, makes these wheats less desirable for milling purposes than those from other sections of the world offered in European markets which wheats have a moisture content seldom exceeding 14 and sometimes as low as 10 percent. The conditions responsible for high-moisture content in European wheats are also liable to cause serious damage to the grain in the form of sprouted kernels or mustiness. These forms of damage are present to an appreciable extent in the wheats of most western European countries almost every year, and in very wet years a considerable portion of the crop is affected to such an extent that it is unsuitable for milling purposes.

Except in some of the eastern European countries foreign matter is present in European to a much less extent than in North American wheats. The wheat of western European countries is usually practically free from weed seeds and other foreign matter. Even rye in wheat is not of common occurrence, except in the important rye-producing countries in southeastern Europe. Mixtures of wheat and rye occur in certain sections of other European countries but usually only as the result of a deliberate attempt to produce a mixed crop. Such mixtures are generally referred to as maslin in crop reports.¹ The production of maslin reported for Europe amounts to about 100,000,000 bushels annually.

Smut balls and smut spores are seldom present to any appreciable extent in European wheats, except sometimes in Russian wheat.

Garlic bulblets occur in some French wheats and to a lesser extent in the wheats of other southern countries, but they are not nearly so prevalent as in the soft winter wheats of eastern United States.

The Governments of most European countries are giving attention to the development and selection of varieties having superior yielding tendencies and baking quality, Sweden, Italy, Spain, Germany, the United Kingdom, Switzerland, Union of Soviet Socialist Republics, Hungary, and possibly other countries among them. Formerly chief attention was given to the development of high-yielding varieties but during recent years, owing to greatly increased production and to the economic necessity for limitation of imports, increasing attention has been given to the development of varieties of superior baking quality.

Hungary has probably succeeded beyond any other European country in improving the quality of its wheat during recent years. Its success in this direction no doubt was due partly to the fact that its soil and climatic conditions are conducive to the production of good-quality wheat and partly to the fact that the producers and millers of Hungary were aware of these possibilities through past experience. Before the World War, Hungary had been producing wheat of excellent baking quality, but during the war, owing to a shortage of food supplies among the countries allied with Germany, yield became a matter of greatest importance with the result that a considerable portion of the production of those varieties which were of good quality was displaced by high-yielding square-head varieties imported from western European countries. These varieties, although outstandingly high yielders, are notable for their low baking quality.

¹ Maslin also includes mixtures of wheat, oats, and barley, and of oats and barley.

After the close of the war, with the return to normal production in western European countries and its attendant reduction in their import requirements, it became increasingly difficult to find an export market for low-quality wheats. Hungary, being an exporter of wheat and flour, quickly saw that if it were to maintain its position as an exporter it would have to improve the quality of its production. Achievements in this direction have been remarkable, which fact, because of Hungary's proximity to the European wheat markets, is bound to impair the future European market for North American hard wheats.

Most of the other European countries that have been striving to improve their production of wheat are greatly handicapped in the matter of quality improvement, by the fact that their climatic and soil conditions are not suitable to the production of high-quality wheat. Such countries have had to be content with a lower degree of improvement in quality. One effective means by which improvements in quality have been accomplished is in the elimination of the weaker varieties from production. This procedure has given a few beneficial results.

In the variety-improvement work as regards yield, Italy's accomplishments in connection with the "Battle of Wheat" have been of noteworthy importance.

GENERAL MILLING PRACTICES

In most respects mills and milling technique are about the same in Europe as in the United States, the differences usually being due to some difference in the conditions affecting milling. It is true that most European countries have a great number of mills of an obsolete or antiquated type, but these are no worse than some that are still operating in certain sections of the United States. Some mills of modern type are found in all the countries of Europe. These modern-type mills produce nearly all of the flour that moves in commercial trade; the antiquated mills usually do only a grist-grinding business for the peasants. Many of the mills of this latter type are operated by wind power.

United States mills usually mill only domestic wheat and that, too, generally unmixed as regards class; consequently, there is little variation in the kernel texture and the moisture and foreign-matter contents of the various lots of wheat included in the milling mixtures of these mills. On the other hand, the wheat mixture milled by commercial mills in the wheat-import countries of Europe usually consists of domestic wheat mixed with one to four kinds of foreign wheat. The wheats in these mixtures frequently vary greatly in size, shape, and texture of kernel and in moisture content, besides containing many kinds of foreign materials.

For properly preparing such a wheat mixture for milling, the miller needs a varied assortment of cleaning and conditioning devices. Thus it happens that the cleaning and conditioning equipment generally found in the large commercial mills of Europe includes wheat washers, driers, heaters, and special cockle and oat separators, in addition to the cleaning machines ordinarily found in all modern mills. Furthermore, to mill properly mixtures containing wheats differing widely in kernel texture and other physical characteristics,

the miller must use a longer milling process involving greater refinements in stock separation, an increase in the number of grinding operations, and a somewhat milder treatment on the breaking operations. This, to a certain extent, accounts for the fact that European millers generally use a great deal more bolting surface per unit of product than do United States millers and approximately double the amount of grinding surface. Speed differentials on the reduction rolls are lower and greater pressure is applied in operating them, as a consequence the stock coming from these rolls is in a flaked condition and must be passed through a disintegrator before sifting.

The grain-storage accommodations in European mills are frequently of the warehouse type rather than the silo or hoppers-bin type so prevalent in United States mills. Cheap labor is largely responsible for this. The amount of storage space and the quantity of wheat stored at European mills in comparison with grinding capacity are usually much less than at United States mills. One reason is that commercial stocks of wheats from the exporting countries are usually close at hand, which makes it unnecessary for the miller in most European countries to carry any considerable quantity during any period of the year.

European mills, except in countries where the extraction percentage is definitely limited by governmental decree, mill to a higher flour extraction percentage than do United States mills. In some European countries flour extraction runs as high as 80 percent. The reasons for such high extractions are that the differential between flour and feed prices is usually greater in Europe than in the United States and there is a ready market for low-grade flour for human consumption, either by itself or mixed with flour of higher grade. This tendency toward high-percentage flour extractions is partly responsible for the extra bolting and grinding surface used by European mills over that used by United States mills.

In the British Isles and the cooler sections of western Europe, flour of domestic production is marketed at a moisture content 1 to 2 higher in percentage than the maximum (15 percent) permitted in the United States.

Chemical laboratories are less prevalent in European than in United States mills, and they play a somewhat different role in European than in United States milling operation. More emphasis is placed upon experimental work for determining the proper method of conditioning wheat and treating flour to insure satisfactory baking results. Some routine tests are performed, but not to so great an extent as in United States mills. The protein content of wheat or flour is only occasionally determined, except in Swedish mills. The European miller and cereal chemist base their judgment of baking quality on gluten content and quality. Moisture content is given important consideration. Ash-content determinations serve the European miller to some extent as a guide in the separation and segregation of the various flour streams into different grades but they are seldom given any consideration by the baker.

TYPE AND QUALITY OF WHEAT REQUIRED FOR EUROPEAN TRADE

The type and quality of wheat required by the European trade depend considerably upon the purpose for which the wheat is to be used. Among the various countries the general type of wheat re-

quired for any of the various purposes is about the same but between certain countries there is a marked difference in the proportionate quantity needed for particular uses. As in the United States the principal use of wheat is in the production of bread for human consumption. In the British Isles and in southern continental Europe, practically all the bread consumed is made solely from wheat flour. In northern, northwestern, and some central European countries, however, the wheat flour is mainly used in combination with rye flour in the production of a mixed wheat-and-rye bread. Its use with rye flour in the production of bread extends even to the so-called rye bread, which although generally considered to be made from pure rye flour, almost always contains a small percentage of wheat flour.

Other baking purposes, for which wheat is used include the production of cakes, pastries, pretzels, biscuits, noodles, alimentary pastes (such as macaroni and spaghetti), and certain home-cooked dishes. Wheat flour or wheat semolina is practically always used for these purposes. The only other baked product besides rye bread and mixed bread in which rye is used is a hard-cracker type of biscuit known as knackebrodt. This product is used extensively in Germany and the Scandinavian countries.

As the production of corn in most European countries is impracticable on account of unsuitable climatic conditions, the use thereof as a feed for animals and poultry is considerably more important than in North America. Moreover, the peasant farmers in countries that do not produce corn are not so well acquainted with the relative worth of corn as a feed and so naturally use domestic feed grains more than is justified by their price. Formerly only domestic wheat of a quality unsuitable for milling purposes and the very cheapest foreign wheats were so used. In recent years its use as a feed has increased somewhat in some of the countries. Although maintaining a high duty on importations of wheat for milling purposes, some countries permit its importation duty-free or at a low rate for feeding purposes. In some countries, notably France and Sweden, in which, during the last few years, the supply of domestic wheat has exceeded domestic requirements for milling purposes, a proportion of the crop has been made available for feed by the payment of bounties without affecting the price paid the producer. Such wheat is usually denatured to insure against its use for human consumption.

The quality and type of wheat suitable for European requirements vary somewhat with the purpose for which it is desired. For feeding purposes the cheapest wheats are generally suitable except that they must be reasonably sound and clean. Soft wheat is generally preferred to hard wheat for poultry feeding, but since soft wheats are usually cheaper, this requirement is relatively unimportant. In the Netherlands and the British Isles, white wheats are definitely preferred to red wheats for poultry feed, and in certain sections of these countries for animal feed as well.

European feeders of animals of all kinds are well aware of the effect of moisture content on the intrinsic worth of grain and, in a general way, give some attention to that factor when purchasing wheat. This also is true of the milling trade. It is not the practice to make a determination of moisture content at the time of purchasing, but from past experience with wheat from various parts of the world, European buyers know the moisture content usually occurring in the

wheat from each country, and they adjust their buying prices accordingly.

The type of wheat considered suitable for baking purposes in Europe varies somewhat from country to country. Wheats of the common species, which will produce a flour of medium or slightly less than medium strength, are generally regarded as suitable for the production of wheat bread. Certain exceptions to this rule are found in the following cases. In Scotland only wheats of strong baking quality are desired for bread flour. In Ireland the requirements for commercial bread are somewhat similar to those in Scotland, but for home-baked breads, which constitute a major portion of the bread consumed, a weak type of wheat similar to the soft white wheats of the Pacific coast of the United States is wanted. In the durum wheat-producing sections of Spain, flour made from durum wheats is preferred for use in making the common bread. Cheap bread made from durum wheat flour is also consumed in other sections of that country, but its popularity there is confined to the laboring people. In certain sections of Italy and Union of Soviet Socialist Republics, bread made from durum wheats is used; in the latter country it is especially popular in the middle Volga section.

The general tendency in bread making throughout Europe is to use medium- rather than strong-quality flours (as in the United States). This is due primarily to the fact that no high-speed dough mixers are used in European countries. With the use of slow-speed dough mixers, it is possible to get satisfactory baking results with weaker flours than with high-speed mixers. High-speed mixing, although tending to increase the water-absorbing properties of a strong flour, has a disintegrating effect on the gluten of weaker flours, which results in an inferior bread product.

Wheats of medium or even weak quality are generally suitable for the production of flour for household uses. In most European countries the use of flour in the homes is chiefly for purposes of a very simple character requiring no special quality of flour. Bread baking in the homes is not a common practice except in a few countries; neither is cake and pastry baking. In a few countries, however, where home baking is extensively practiced, quality requirements for household flours are usually very exacting. Probably the two countries that are most exacting in this respect are Austria and Hungary.

The type of wheat most suitable for use in the production of alimentary pastes, such as macaroni and spaghetti, is durum. In southern France and Italy, the principal areas of consumption of alimentary pastes, amber durum wheat of high quality is wanted, although in some instances a cheap-grade product is made from semolina milled from common wheat of the hard or semihard type. Similar quality requirements as regards wheat for this form of food prevail in other European countries, where its consumption is not nearly so great.

Throughout Europe and particularly in the British Isles, sweet cakes or tea biscuits of the short-bread type are very popular as a supplementary food to the afternoon cup of tea or coffee which the middle and upper classes of people, and in England the lower classes as well, habitually drink. In the production of these cakes, wheat flours of weak quality are most suitable. English wheat is especially suited for this purpose.

Contrary to the practice in the United States, strong flours are required in the commercial production of pastries in several of the countries of Europe. In some of these countries, flour used for this purpose is of very coarse granulation.

Pretzel making, which is of little importance except in Germany, Czechoslovakia, Austria, and Hungary, requires a flour of only ordinary baking strength, such as can be produced from the domestic wheats of these countries.

For the production of the various qualities of flours suitable for European baking purposes, most of the countries have in their domestic crop an ample supply of all the weak wheats needed, but they lack a sufficient supply of the strong wheats. In countries in which total wheat production is about equal to the domestic quantitative requirements, only foreign wheats of the highest quality are generally imported. However, in countries which produce only a small proportion of their wheat requirements, as in the case of the British Isles, Belgium, Switzerland, and a few other deficit countries, a considerable percentage of the importations may be of weak- or medium-quality wheats and only a relatively small percentage of strong quality. In fact, the large-scale import requirements of these countries permit, to a limited degree, the use of almost any type of wheat, because it can be combined or mixed with wheats of other qualities which will either supplement or offset any deficiency or peculiarity in quality that it may have.

European millers consider hard spring wheats from Canada and United States to be strongest in baking quality. But no hard spring wheat from the United States has been offered in recent years. Hard winter wheat from the United States is also given a high quality rating, but is considered slightly inferior to Canadian spring wheat. If milled by itself, it more nearly fits the European standard of quality for bread flour than does any other type of wheat. It is therefore a very useful wheat in all European countries where the importation of foreign wheat is not confined to a small percentage of the total requirements.

Russian wheat of the common type is considered to be of variable quality, ranging from weak to very strong. Argentine and Hungarian wheats are also considered variable in quality, with an upper extreme somewhat lower than that for Russian wheats, but they are useful as fillers in mixtures that can contain a high percentage of foreign wheat. Australian wheat is of soft texture and is considered to be of weak baking quality, but because of its low moisture content and good milling properties (flour of good color and high yield) it is useful in milling mixtures that contain a considerable proportion of high-quality wheats. For European milling requirements for macaroni semolinas, United States and Canadian amber durum types are given first preference. Some Russian durum wheats are also highly esteemed but, like the common wheats from the same source, they are in general undependable in quality. The north African and Argentine durum wheats are not given a very high rating. The former, besides being of inferior quality, usually contains a relatively high percentage of other types of wheat.

HISTORY AND PRESENT STATUS OF EUROPEAN BREAD CONSUMPTION¹

MAIN STAGES OF DEVELOPMENT

Three main stages may be clearly distinguished in the consumption of bread grains: (1) The rise, (2) the decline, and (3) the stabilization.

The food made of cereals in the early history of European countries was not the bread of today, a fermented dough baked in the oven. It was a mixture of flour with water or some other liquid boiled on the fire. With the development of the bread-making technique, the boiled product was gradually replaced by the baked, and the unfermented product, whether baked or boiled, by the fermented.

All the cereals and buckwheat have been used in boiled preparations and baked unfermented bread, whereas only wheat and rye have been used in the fermented bread. Wheat now generally holds first place among the cereal grains as material for boiled cereal preparations (porridge, noodles, dumplings, macaroni, and similar products) and for flour used in the kitchen; nevertheless, even today grains other than wheat are sometimes preferred.

The shift from the boiled preparations and the nonfermented but baked bread made of all kinds of cereals (and buckwheat) to baked fermented bread made of wheat or rye marked the first step toward an increase in bread-grain consumption in Europe. Then, with the passage of time, wheat and to some extent rye became the practically exclusive materials used for cereal preparations other than bread, such as cakes, crackers, and pastries.

Thus the main feature of the historical development in cereal consumption in Europe for a long time was the elevation of wheat and rye to the position of the principal materials for cereal foods, while all other cereals and buckwheat were gradually being lowered to the position of feed grains.

Many instances may be quoted in which the consumption of bread grains and other cereals as human food has increased simultaneously. There have been times in the history of most European countries when a considerable portion of the population was either unable to obtain or too poor to afford all the grain desired for food, and in some instances the defection in food supply caused by one or the other of these conditions has been so great that many people starved to death. After such a condition has prevailed, any improvement in the food-supply situation frequently has been followed by an increased consumption of both bread grains and other cereals but such a simultaneous increase was the exception rather than the rule.

Increased consumption of bread grains until more recent times has been brought about by the displacement of potatoes. Because of the manner or form in which potatoes are generally prepared, they are now generally a substitute for boiled cereals, but historically they were primarily a substitute for bread, having at some time or another caused a considerable reduction of bread consumption in several European countries. The rapid rise in modern times of the income of the common people of some of these countries reversed the trend, with the result that bread consumption re-expanded at the expense of potato consumption.

¹ Credit is due to N. Jasny for assistance in the preparation of this section.

What is true of potatoes is, to some extent, true also of dried legumes, which are primarily not a substitute for cereals or potatoes (foods rich in carbohydrates), but for meats and eggs—two of the main sources of the protein needed by the human body. Mashed peas particularly are used in competition with mashed potatoes and similarly prepared cereals, so the great decrease that has occurred in the consumption of dry legumes has to some extent also been reflected in a larger demand for bread.

Although there is some tendency for the more expensive diets of today to contain bread made from whole-grain flour, probably the most important factor in the increased consumption of bread grains, since wheat and rye were singled out as the exclusive materials for use in bread production, was the tendency to use whiter or more refined flours in the production of the common breads. Each increase in the percentage of bran and other mill offals separated from the product destined to be used for bread making means a proportionate increase in the quantity of grain required for milling purposes. In some of the eastern countries of Europe, particularly Poland, such a development is still in progress. The process has been slow, because the low purchasing power of the common people renders white or bolted flour, or bread made therefrom, a luxury.

The tendency in European countries to relegate some of the cereals to feed for animals instead of for human consumption did not stop when the cereals primarily used as human food were limited to wheat and rye. The latter grain has been following the path previously followed by oats and barley. In fact, in some European countries which formerly were predominantly rye-bread-consuming rye has already come to be considered a feed grain. The British Isles offer a notable example of this; a few centuries ago rye was the principal bread grain but today annual consumption amounts to less than 2 pounds per person. For more recent indications of this tendency Norway and Sweden offer the best examples.

Long before the mass demand of bread consumers is entirely satisfied, the first signs of a reverse movement appear. The diversification of food in the diet of the well-to-do is usually responsible for the first decrease in consumption. The immense increase in incomes in recent decades has greatly augmented the number of people who could afford diversified food.

During recent times the movement toward diversification of the diet has been strongly supported by the development of nutrition science, particularly by the discovery and isolation of the various vitamins. Food that had been considered merely a luxury suddenly moved into the rank of indispensable requirements of a healthy life.

The movement toward diversified food, with its subsequent reduction in the consumption of bread grains, has been considerably accelerated by improvements in transportation facilities and methods of food preservation. Thus, the consumer is not dependent upon the community in which he lives for his supply or variety of food. Neither is his selection of food seriously limited by seasonal influences.

Another factor that has contributed materially to the decline in consumption of bread grains is the occupational changes brought about by machine production. Occupations have become less arduous and the hours of labor have been considerably shortened

in many instances, with the result that workers now need less and lighter food.

The point at which the reduced consumption of bread grains overcompensates any increase in consumption which might still be proceeding among the poorest part of the population, marks the beginning of the second main stage (the decline) in the development of bread-grain consumption.

When a large proportion of the bread grains consumed still consists of rye, the decrease in consumption does not necessarily mean a decreased consumption of wheat. This is because the utilization of rye for human food frequently decreases more rapidly than does the total consumption of bread.

After a great part of the population has shifted to a diversified diet, and after no further elimination of arduous occupations occurs through the adoption of machine production, any further decrease in the per-capita consumption of bread grains must be small. Finally stabilization occurs at the new low level, marking the third or final stage in the development of bread-grain consumption.

LONG-TIME TREND BEFORE THE DEPRESSION

The long-time trend of the development in bread consumption in Europe, excluding the Union of Soviet Socialist Republics, as it appeared before the present depression, seemed to indicate that all three main stages described above were represented. The second stage appeared to be dominant.

Yugoslavia and Poland probably were the only two of the more important countries of Europe (excluding the Union of Soviet Socialist Republics) in which, before the depression, an increase in per-capita consumption of bread grain could have been confidently expected on the basis of the long-time trend. In other words they were still in the first stage of development. An increase in the per-capita consumption of bread grains seemed not to be impossible in Rumania. In the case of Yugoslavia and Rumania a further increase would have been at the expense of the still rather widespread utilization of corn for food, while in the case of Poland a further increase would have represented a shift from whole-grain flour to a more refined product. Aside from these three countries, increases in consumption of bread grains seemed also likely to take place in sections of other European countries where the consumption of whole-grain flour bread (Baltic countries), potatoes (some sections of Germany and of neighboring countries), or corn (parts of Italy and some sections of the Danube Basin aside from Yugoslavia and Rumania) is still large.

The third, or stabilization, stage in the development of bread consumption probably had still fewer representatives in Europe than had the first stage. Aside from Great Britain there was scarcely any other European country in which no further considerable decrease in consumption of bread grains could have been confidently expected or, in other words, where consumption had become stabilized.

Most of the large countries of Europe seemed to have been in the second stage of development; that is, they had passed their peak in per-capita bread consumption. In most of them the proportion of bread grain in the diet still was high. In this group a decrease in consumption could have been confidently expected. The consump-

tion of bread grain was particularly high in Spain, France, Belgium, Germany, Italy, Poland, and in all countries which, before the war, were parts of Austria-Hungary. In many of these even the well-to-do people were, and still are, heavy consumers of bread.

This fact would indicate that in these countries the people are more reluctant to change their diet in conformity to modern notions and requirements regarding nutrition than is usual in other countries. This reluctance might have retarded, but could hardly have prevented, the expected decline in per-capita bread consumption. Moreover, the rate of population growth in many countries of Europe (excluding the Union of Soviet Socialist Republics) had become very slow and was still decreasing, so there was not likely to be any increase in total consumption of bread grains from that source. There was an immense difference in this respect between post-war times and the last few pre-war decades when the population was growing at a rather rapid rate in all countries, other than France, while in many countries the per-capita consumption of bread was still increasing.

CONSUMPTION TRENDS DURING THE DEPRESSION

The ups and downs of the usual business cycles generally do not appreciably interfere with the long-time trends of consumption of bread grains. At any rate, effects of this kind are not indicated by such statistics on utilization of grain as are available. The exceptionally severe depression now being experienced, however, constitutes an exception to the above rule, by causing in some countries considerable deviation from the long-time consumption trend, even to the extent of reversing it. Thus, in Germany and possibly in some other countries, the consumption of potatoes, instead of decreasing as in the years of prosperity, may actually increase. In some countries there has also been a noticeable increase in the utilization of rye at the expense of wheat. Unfortunately no data are available to indicate what has taken place during the depression as regards the human consumption of corn in those parts of Europe where that grain is an important food.

An entire reversal of the long-time trends would require an increased consumption of bread grains in countries which formerly had a generally decreasing consumption. For no country can this be proved.

In some European countries there probably has been a considerable reduction in the consumption of bread grains without an actual reduction in the consumption of bread. This is possible through reduced consumption of cookies, cakes, pastries, and alimentary pastes, made of wheat flour, resulting from the lowered purchasing power of the population. It was chiefly the cost of the other ingredients (fat, sugar, etc.) used in these products which put them beyond the reach of the consumers.

In instances where bread consumption was actually reduced, the reduction was only in part due to considerations of cost. In many countries of western Europe some of the reduction in the past few years was due to a deterioration in the quality of the bread, resulting from the discontinuation of, or the decrease in, the imports of high-protein wheat and from the higher percentage extraction of flour from wheat prescribed by law. High-protein wheat is indispensable as an admixture to the soft domestic wheats of western Europe if a bread of good texture is to be produced.

Reductions in bread consumption as a result of economic considerations probably have taken place only in countries where the economic situation has been particularly bad, as for example in Germany and Austria. Moreover, wheat bread in these countries is primarily consumed in the form of small, relatively expensive rolls. Many consumers have had to deprive themselves of these rolls along with other relatively expensive products such as meats, milk, fats, and eggs.

The fact that no increase can be shown in per-capita bread consumption for any country during the present depression, while for some countries there is convincing evidence of a considerable reduction in consumption, may possibly be taken as indicating a persisting tendency towards a reduction in bread consumption in recent times. The nutritional value of bread evidently has lost much of its former significance in the eyes of the consumer, so that, when he must economize on his food bill, more consideration is shown other foods than formerly. Particularly striking is the change in usage of fruits and certain kinds of vegetables. A few decades ago many consumers would have eliminated fruits and the more expensive vegetables, before thinking of even a small reduction in the quantity of bread. Furthermore, the reduction in the consumption of cakes and pastries at that time probably would not have been larger than that of fruits and expensive vegetables at present.

The peculiar behavior of bread-grain consumption in the present depression suggests the possibility that the changes may not disappear with the restoration of normal conditions. The enhanced decrease in bread consumption, although resulting from temporary causes, is likely—at least in part—to become permanent. Compelled to use less bread, some of the consumers may be surprised to find that they can do well with the reduced quantity and when they no longer need to economize they may increase the consumption of products other than bread. The same may be true of macaroni and similar products. On the other hand, the consumption of cookies and of flour used in the kitchen might be restored in full.

The long-time trends, as they seemed to run at the end of the last prosperity period, therefore, might not be resumed entirely. At least it is not very probable that any restoration of prosperity within the next few years would be followed by a full resumption of the former trend in the consumption of bread grain. In short, the course of bread-grain consumption during the depression provides some indication that the trend downward has become stronger in countries of decreasing consumption. On the other hand, in countries with a rising consumption, the same causes may result in a potential peak consumption lower than that which might have been confidently expected a few years ago. Moreover, this lowered peak consumption may be reached at an earlier date than might formerly have been expected.

The situation as regards future requirements for wheat alone is somewhat more encouraging than in the case of all bread grains. In Austria, Czechoslovakia, and the Scandinavian countries, as well as in all other countries bordering on the Baltic, rye consumption was and still is rather high. In spite of rye consumption being favored by the climatic conditions (the severe climate both impedes the production of wheat and makes the consumption of rye less objectionable) and the modern ideas about the close connection between rye

bread and the Nordic race, the replacement of rye by wheat, which has been proceeding for a long time in these countries, is not likely to stop. But in some of these countries it is probable that the rate of the decline in rye consumption may not prove to be very rapid, and that the limit at which the development will stop may be somewhat higher than in the more westerly countries with a considerably milder climate.

THE BREADS OF EUROPE

PRINCIPAL TYPES CONSUMED

In the British Isles, Netherlands, France, Spain, Portugal, Italy, and the Balkan countries, wheat-flour bread is the predominant type consumed, whereas in the northern European countries rye bread and mixed rye-and-wheat breads are the predominating types. Corn is of considerable importance as a human food in certain areas of southern Europe, but it is not generally consumed in the form of bread. It is used more often as a substitute for bread than as a bread.

In those countries which are predominantly wheat-bread consuming, two or more grades of wheat bread are produced. In the eastern countries the difference in quality between these grades is very marked, but in the western countries it is not so well marked. On the other hand, in those countries in which wheat bread does not predominate, usually only wheat breads of the best quality are produced because (1) the greater part of their consumption is by the well-to-do people to whom price is a secondary consideration, and (2) even the poor want good quality in a product which they can afford only on holidays and other special occasions.

As in North America, most of the bread is in loaf form but the use of rolls and buns is significant, as they constitute the principal item in the breakfasts of most European city folk. Rolls are almost exclusively a wheat-flour product, although rye-flour rolls are found in some of the northern countries. No water-cracker types of wheat-flour breads are consumed in Europe, but in some of the northern countries there is a considerable consumption of hard breads and crackers made from rye flour or rye meal. Following are comments on the breads most commonly used in the various countries of Europe and the general grades of flour from which they are made.

Albania.—Wheat bread and corn bread are commonly used. The wheat bread is made from the lower grades of flour including middlings. Rye bread is not used.

Austria.—Both wheat and rye breads are consumed throughout Austria. The most common breads are rye and mixed rye and wheat. The wheat breads, which are found almost exclusively in the form of rolls, are of very good quality and are considerably higher in price than the common breads; the poorer people cannot now afford them.

Belgium.—The common bread is made from wheat flour. It is generally produced from a medium-strength flour of average milling grade, is of good quality, and at present is among the best to be found in Europe.

British Isles.—Throughout the British Isles the bread is almost exclusively of wheat. The common breads are generally of good quality. Commercial common bread of the best quality is produced in Scotland and Ireland. It is made from a strong flour of good milling grade, whereas the common breads of England and Wales are made from a

medium-strength flour. In Ireland the home baking of bread is still extensively practiced; the flour used is of weak baking strength.

Bulgaria.—The common bread is a so-called wheat-flour bread made from a mixture consisting of 90 percent wheat flour and 10 percent rye flour. According to an official estimate, 75 percent of the total bread consumption is of this so-called wheat bread, 22 percent of white bread, and 3 percent of rye bread. The wheat flour used in the common bread is of a cheap grade. Corn is used to some extent as a human food but chiefly in a form other than bread.

Czechoslovakia.—Mixed wheat-and-rye bread is the predominating type consumed. Some wheat bread of good quality is produced, but is classed as a luxury food by the common people.

Denmark.—Consumption is about equally divided between rye bread and wheat bread. The former is the predominating type among the poorer classes of people and the latter the predominating type among the well-to-do. Only one quality of wheat bread is made; short-extraction or patent flour of medium-strong gluten characteristics is used in its production.

Estonia.—In Estonia rye bread is most generally used.

Finland.—Rye bread predominates. Some wheat bread is consumed but usually only in cities. Two grades of wheat-flour bread are made, the one of poor or ordinary quality and the other of good quality. Strong wheat flour is used in making the latter.

France.—The common bread is of wheat. It is generally of very good quality but at present, owing to the drastic restrictions placed on the importation and use of foreign wheat and flour, its quality is rather poor. Medium-strength flours of good milling grade are desired for production of this bread, but inasmuch as domestic wheats are of relatively low gluten strength, this requirement is not being met at present. Rye-bread consumption is not of importance, except in certain northern Provinces.

Germany.—The predominating type of bread consumed is, in some sections, mixed wheat and rye, and, in other sections, rye. The consumption of whole rye, or black, bread is also important. Very little wheat bread of the loaf type is used, but consumption of wheat-flour rolls is rather high, amounting to about 30 percent of the total bread consumption. "Straight" and "bakers" grade wheat flours of less than medium gluten strength are used in the common-quality rolls and loaf breads. Short-extraction and patent wheat flour of medium strength is used in the production of the best-quality rolls and loaf breads.

Greece.—The breads are made only from wheat flour. Rye-bread consumption is negligible. Long-extraction and "clear" flours are used in the common breads.

Hungary.—Wheat breads predominate. Very little pure rye bread is consumed. The breads principally used are of three sorts or qualities—brown, gray, and white. The brown bread is cheapest in price, but the gray is most commonly used. White breads are chiefly of the roll type. Brown bread is made from a mixture of 85 percent of "low-grade" wheat flour and 15 percent of rye flour. Gray bread is made from a "clear" wheat flour. White breads are made from patent wheat flour. In the production of much of the common and cheap sorts of bread, it is customary to use boiled potatoes as one of

the baking ingredients. These are sometimes mixed with flour in the proportion of 1 to 4.

Italy.—Bread is almost wholly of wheat flour. Rye bread accounts for only approximately 1 percent of the total bread consumption. The common wheat breads are made from long extraction and "clear" grade flours, the latter predominating. In the southern Provinces some durum wheat flour is used in bread production. In certain sections of this country corn is of some importance in the diet of the people but not as a bread.

Latvia.—Approximately 60 percent of the bread consumed is rye, and the remaining 40 percent is wheat. Mixed wheat-and-rye bread is not used.

Lithuania.—Rye bread is the predominating type used.

Netherlands.—Wheat breads predominate. The consumption of rye and mixed wheat-and-rye breads is of little importance. Whole-wheat bread made from domestic wheat is the cheapest bread produced, and, although not the predominating type, it is of significance. Its consumption is chiefly among the poor and peasant classes of people. The middle and upper classes consume mostly white breads, made from a medium strong wheat flour of good milling grade and are generally of good quality. Milk is used in the production of probably one-fifth of the bread consumed.

Norway.—Rye and mixed wheat-and-rye breads are the predominating types consumed. Some wheat bread is used, but it is not the common bread of the country. In recent years the consumption of wheat bread and mixed wheat-and-rye bread has been increasing. Short-extraction or patent flours are used in the production of wheat bread. Fairly strong wheat flours are demanded for the better-quality wheat breads, but for the ordinary wheat breads medium-strong flours are used.

Poland.—Rye bread is the common bread of Poland, much of it being of the dark or black type. Mixed wheat-and-rye bread is also of some importance. Wheat bread is the least used.

Portugal.—Wheat bread predominates, but an appreciable quantity of rye bread also is used. The wheat flour from which the common wheat bread is made is a long-extraction flour milled from a wheat mixture containing a considerable percentage of domestic poor-quality durum.

Rumania.—Wheat bread of mediocre quality is the predominating type. Rye bread is of little importance, but there is a considerable consumption of corn either as bread or as a bread substitute. The consumption of good-quality wheat bread accounts for only about 5 percent of the total bread consumption.

Spain.—The bread is almost entirely of wheat. The common bread in some of the Provinces is made from durum-wheat flour, but in most of the Provinces it is made from common wheat flour of long extraction and medium gluten strength.

Sweden.—Mixed wheat-and-rye bread is the predominating type. There is also a considerable consumption of wheat bread, soft or ordinary rye bread, and hard rye bread. The wheat and soft rye breads produced are usually definitely sweet in flavor, made so by the use of sirup or honey. High-grade wheat flour of medium to high gluten strength is generally required for wheat-bread production, but in mixed-bread production a second-grade wheat flour is

required. At present, the mixture of flours used in mixed-bread production consists of about equal parts wheat and rye; formerly it consisted of a smaller proportion of wheat flour.

Switzerland.—The bread most commonly consumed at present is a gray so-called "wheat bread" made from a flour mixture consisting of 90 to 95 percent of wheat flour and 5 to 10 percent of rye flour. This bread is slightly gray in color but is otherwise of good quality. The wheat flour used in its production is of long extraction but of good gluten strength. Some wheat bread of very good quality is produced but its consumption is not extensive. Rye bread is in little demand and for that reason costs as much as or more than the common wheat bread. Before the depression the wheat breads of Switzerland were of excellent quality. At that time only high-grade, good-quality flours were used in their production.

Turkey.—The common bread is made from a mixture of wheat and rye flours consisting of 15 to 20 percent of the latter. The wheat flour used in the production of this bread is of a cheap grade.

Yugoslavia.—The bread consumed consists almost exclusively of wheat. Only a very small quantity of rye bread is used. Corn is an important human food in this country, at least as a bread substitute.

CHARACTERISTICS OF WHEAT BREAD

European wheat breads vary considerably in physical and quality characteristics, but certain characteristics are more or less common to all. Except in the case of certain common types of French, Belgian, and Viennese breads, they are closer textured and much heavier than are United States breads; in some instances they are nearly twice as heavy for the same volume or size of loaf. They have more of the characteristic or natural flavor of wheat. In color of crumb they are not so white. In some of the countries, particularly in eastern Europe, the common wheat breads are of a distinctly gray color. In the British Isles, France, and Belgium the common breads are of light, creamy color. In Spain they are of a rich, creamy color.

Most of the bread is hearth-baked; only in the British Isles and the Netherlands is the pan type of loaf produced to any considerable extent. Some of the wheat-flour bread consumed in Germany is also pan-baked, but the consumption of wheat-flour bread in loaf form, either pan- or hearth-baked, in that country accounts for only a small percentage of its total bread consumption. Most of the wheat bread has a hard, tough crust. Only in the British Isles, Belgium, and the Netherlands is there any tendency toward a soft or thin, crisp crust. In most countries two, and in some instances, three distinct grades or qualities of bread are produced, a superior grade for the well-to-do class and one or two poorer grades for the middle and lower classes.

GENERAL BAKING AND MARKETING PRACTICES

Most European bread is baked in small proprietor-operated shops. The modern factory type of bakery is not much in evidence except in the British Isles and in some of the larger cities of the continental countries, and even there the shop type of bakery still holds an important place in bread production. The baker, as a general rule,

sells his product direct to the consumer and, in most instances, the sales are made over the bake-shop counter.

The large modern-type baking establishment, in order to sell direct to the consumer, sometimes maintains a chain of sales shops at favorable marketing locations throughout the territory in which its products are distributed. In Denmark, bakers operating small shops have formed cooperative bread factories for the production of common bread. Their luxury-type breads, cakes, pastries, and specialties they make in their own shops. The bread made in the bread factories is distributed to these small shops at cost price and is sold along with the products made by the shop owner. Through this arrangement the small baker is able to obtain his supply of common bread at a price below that for which he could produce it in his own shop. This arrangement, also, has the advantage of leaving the shop baker free to devote all his baking energies to the production of luxury products and specialties on which there is usually a higher profit than on common breads.

The baking formulas used by European bakers are more simple than those used by United States bakers. Such ingredients as fat, sugar, and milk generally are not used except in the luxury types of bread, and then not to so great an extent as in United States breads. Moreover, because European breads are generally made from weaker flours, usually less yeast is used, and in some of the common wheat breads it is entirely displaced by sour dough. Yeast foods and chemical flour improvers of some sort are sometimes used, particularly in those countries in which the quality of flour available for baking purposes is especially weak. During recent years their use has been on the increase, owing to the decrease in flour quality resulting from restrictions placed on importations of foreign wheats and flour.

Bread doughs are mixed either with slow-speed mechanical mixers or by hand. Nowhere in Europe are high-speed mixers used. Long fermentation of doughs is preferred, but owing to the existing prohibitions in most of the countries on night labor in bakeries, short fermentation methods are employed in many instances.

It is the general practice in Europe to sell bread to the consumer unwrapped. In countries that produce some of the pan type of loaf, the wrapping of bread in waxed or paraffined paper is practiced to a limited extent, but consumers generally are not willing to pay for this service.

BREAD PRICES

The prices charged for common bread differ greatly from country to country. Many factors are responsible for these differences. In most of the countries the domestic price of bread grain is artificially maintained, through Government action of some sort, at a higher level than the world free-market price. In some cases the domestic price is as much as two and three times the world free-market price. Under normal conditions the price of flour rather closely parallels that of the grain from which it is produced, but when the price of grain is raised by artificial means, it often follows that the increase in flour price must be somewhat greater in order that the price of mill offals may be held at a level sufficiently low to compete with other feeding materials.

Inasmuch as flour is the basic material from which bread is produced, the price the baker is required to pay for it must necessarily

be reflected in the price he charges for his bread. This is the case to a much larger extent in Europe than in the United States, but even in Europe increases in the price of flour do not result in a proportional increase in the price of bread. Other items of expense besides flour enter into the cost of producing and selling, therefore increases in bread prices should be only proportional to the increased total expense of production and marketing, rather than to the increase in flour price alone.

In some of the countries, the common bread is made from flour of weak or ordinary quality and poor milling grade, whereas in certain other countries it is made from flour of good milling grade and quality. The market price of the former is considerably lower than that of the latter, and therefore flour quality affects the price charged for bread.

That the two factors discussed in the foregoing paragraphs have an important bearing on the price of bread is an indisputable fact, but other factors of a variable character also have a powerful influence on the price of bread.

Flours of several different degrees of purity and quality can be, and usually are, milled from any given lot of wheat or rye. These flours are used for different purposes and have different prices. Bread yield and the cost of the ingredients other than flour used in bread production are also important in any consideration of bread price and profit margins. Bread yields vary between 135 and 150 pounds per 100 pounds of flour, depending on the proportion of ingredients other than flour used and upon factors influencing water absorption in the flour and water retention in the dough. In most European countries, the only ingredients used in the production of the common bread are flour, water, salt, and yeast, but in some instances, fat, sugar, milk, and yeast foods are used.

That the price spreads between common wheat bread and wheat, and between common wheat bread and flour, are so much lower in Europe than in the United States can be accounted for mainly by the following reasons:

- (1) The common wheat breads of Europe are usually made from a lower grade and weaker quality of flour; they contain little or none of the high-priced ingredients, such as sugar, fat, or milk, and in some instances sour dough is used instead of yeast as the leavening agent.

- (2) European bakers pay lower wages to their workers and generally operate on a lower margin of profit. In many of the countries, profit margins on the production of common bread are either definitely limited or are supervised by governmental agencies. Much of the bread used in Europe is made in the small bake shops where all, or most, of the labor is provided by the proprietor and his family. Since living standards in Europe are generally lower than in the United States, these bakers can make a satisfactory living from an income which would not be adequate for the support of a United States family.

- (3) In marketing his bread, the European baker usually deals directly with the consumer, and in most bakeries a great proportion of the sales are made over the counter at the place of production. Very little money is spent in advertising. It is not the practice for the shop type of baker to advertise. The common breads of Europe are generally sold in larger unit-weight size loaves, not ready-sliced nor in air-tight wrappers.

CERTAIN ECONOMIC FACTORS AFFECTING THE EUROPEAN WHEAT-REQUIREMENT SITUATION

In the thickly populated countries of western Europe the domestic wheats are not only notoriously inferior in baking quality but the cost of producing them is relatively high. Prior to the World War, while European manufacturers still reigned supreme in the markets of the world, these countries had little objection to the importation of foreign wheats which were not only better in quality than the home-grown product but could be obtained at prices below the cost at which the latter could be produced. In those days, foreign trade balances gave western European countries little cause for worry. Their exports of industrial products and services supplied them with enough foreign exchange to pay for their imports (including wheat which overseas countries could sell cheaper than the European countries could produce it) and to invest abroad.

The war brought about a marked change. The enormous quantities of materials required in Europe for conducting the war, together with the goods required for ordinary living purposes, not only taxed the productive energies of European countries to their full capacity but also provided a market for great quantities of goods from overseas countries. This unusual market situation in Europe greatly stimulated both industrial and agricultural production in other parts of the world, with the result that the close of the war found a greatly restricted market for European industrial products and plenty of foreign competition for what markets remained. Furthermore, the great cost of the war resulted in budgetary difficulties in the European countries involved. Their money was inflated. Domestic capital fled. Hence, their demand for foreign exchange was great, while the supply was small.

With their foreign markets for industrial products either lost or greatly reduced and with their financial condition virtually one of bankruptcy, they found it imperative to give intensive consideration to the domestic-market situation with the idea, on the one hand, of reducing to a minimum their expenditures abroad and, on the other, of increasing employment at home. This resulted in the adoption of a self-sufficiency policy of production in whatever commodities the individual countries were capable of producing. With the adoption of this policy, the domestic-wheat producer was given governmental assistance in some form and protection from foreign competition. Under this policy wheat production has not only reached the pre-war level but, in many of the European countries, has expanded considerably beyond that level.

In the United States, the war brought about a great industrial and agricultural expansion. Industries in most lines expanded beyond the point of domestic needs, and the farmers produced a larger surplus of wheat than ever before (fig. 5). This meant not only that smaller quantities of foreign industrial products were needed, but also that, in regard to certain commodities, there was a larger surplus to sell in foreign markets than before the war. Moreover, the war had changed the United States from a debtor to a creditor nation, which fact made it more difficult for the nations of the world to purchase its goods—agricultural as well as industrial. Aggravating the situation as regards the disposal of the wheat sur-

plus of the country was the increased production which had taken place since the war, not only in European countries, but in the principal competitor exporting countries—Argentina, Australia, and Canada (fig. 6). From 1919 to 1933, wheat production in Europe (exclusive of Union of Soviet Socialist Republics) increased by 865,000,000 bushels, or 98 percent, and that of the three competitor exporting countries named by 289,000,000 bushels or 63 percent (fig. 7).

CHARACTER OF FACTORS AFFECTING REQUIREMENTS

For purposes of this study, wheat requirements mean the total disappearance or utilization for all purposes, including seed, feed, food, industrial uses, and losses. In many of the European countries, because of deficiencies in domestic production, a portion of the wheat needed for these uses must be obtained from foreign countries. These are usually for specific kinds or qualities of wheat or flour, so

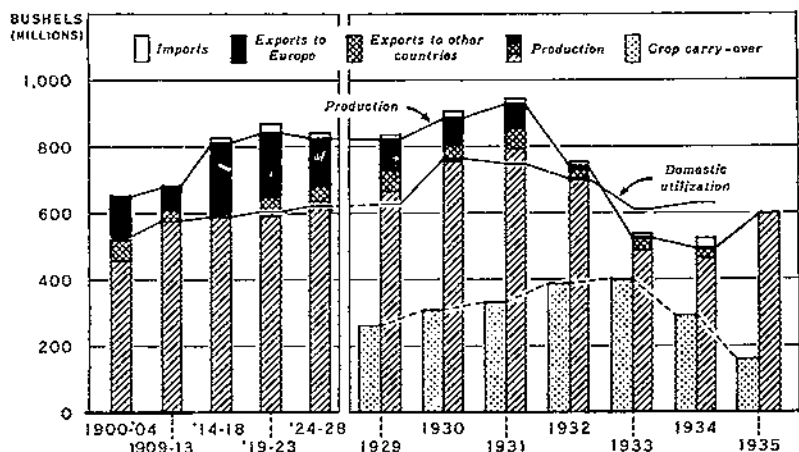


FIGURE 5.—UNITED STATES WHEAT PRODUCTION, EXPORTS, IMPORTS, CROP CARRY-OVERS, AND DOMESTIC UTILIZATION.

Prior to 1919, utilization and exports of wheat usually almost equaled production and imports, but with the decline of exports, which began during the period 1924-28, domestic carry-overs rose from 200,000,000 bushels at the beginning of the 1929 crop year to an all-time high of 400,000,000 bushels at the beginning of the 1933 crop year. Since then the carry-overs have decreased considerably, but only because of abnormally low production.

that in quality as well as in quantity, deficiencies of the domestic crop may be fully supplemented. It is with these import requirements that this bulletin is chiefly concerned, but because of the inter-relationship between import and total requirements any study of factors affecting import requirements should include all the important factors affecting total requirements.

Factors that affect European wheat requirements are considerable in number. Primary or fundamental in character are the factors of quantity and quality of the domestic wheat crop; the quality of the bread product; consumption habits and tendencies; and milling practices. Some of these were discussed earlier in this bulletin. A number of others have considerable effect on requirements at times. These include price and price relationships, rye production and utilization, economic conditions, war considerations, and international trade relationships or agreements.

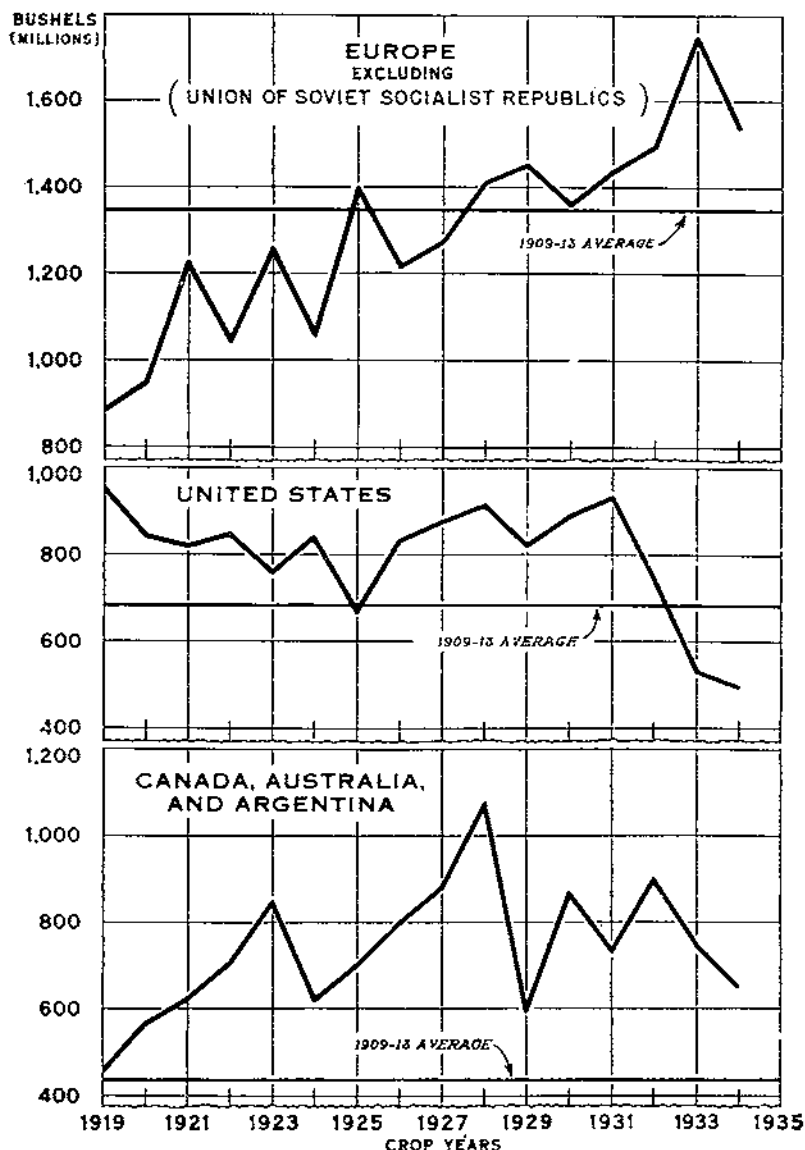


FIGURE 6. WHEAT PRODUCTION IN EUROPE (EXCLUDING UNION OF SOVIET SOCIALIST REPUBLICS) AND IN THE UNITED STATES AND OTHER PRINCIPAL EXPORTING COUNTRIES, AVERAGE 1909-13, ANNUAL 1919 TO 1934.

In 1919, production in Europe was more than 400,000,000 bushels below the 1909-13 average production. Since then its trend has been upward, and beginning 1928 it has been well in excess of the 1909-13 average. In the United States the trend in production was reversed, whereas the combined production in the other leading exporting countries was maintained well above the 1909-13 level.

EFFECT OF CERTAIN FACTORS ON REQUIREMENTS

The world-market price level of wheat has some effect upon European requirements for foreign wheat, but the extent of this effect and its direction are largely dependent upon other economic conditions. For example, in periods of industrial prosperity a low price level will tend to bring increased utilization and sometimes a decrease in domestic production, thereby resulting in proportionately higher import requirements, whereas in periods of industrial depression import requirements may be decreased in spite of low price because domestic production is likely to be materially increased, utilization decreased, internal prices artificially raised, and importations restricted or taxed.

Other factors being equal, however, requirements are to some extent in reverse relationship to price. Especially is this true if the price increase is not associated with a corresponding price increase for other food materials. If during the present depression the internal

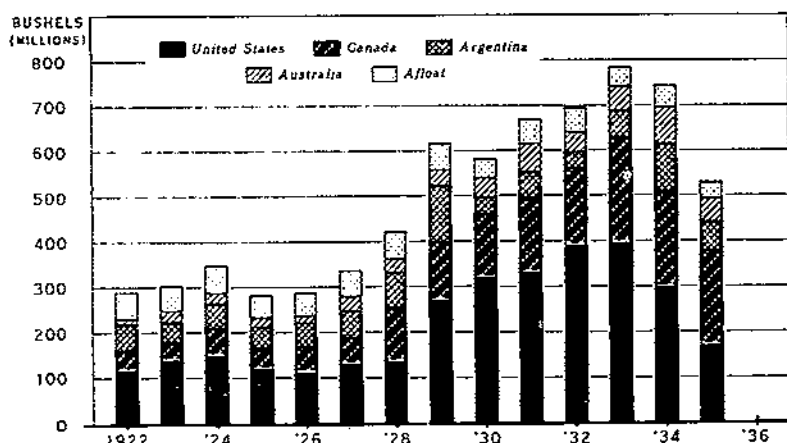


FIGURE 7.—WHEAT SURPLUS IN PRINCIPAL EXPORTING COUNTRIES AND AFLOAT, AS OF JULY 1, 1922 TO 1935.

From 1926 to 1933 wheat surpluses for export in the principal countries nearly trebled, but since 1933 the total of the surplus wheat in these countries has decreased considerably, chiefly because of decreased production in the United States.

prices for wheat in many of the countries had not been artificially raised, it is probable that the reduction in import requirements which has occurred during this period would not have been nearly so great, because it was largely owing to high internal prices that European production was increased.

Rye is not only the most important bread-grain crop in the northern and some of the central countries of Europe, but it is an important bread material as well. In some of these countries it predominates over wheat as a bread material. The principal use of wheat flour in these rye-bread countries is in the production of rolls, cakes, pastries, and gravies. Its use in the making of loaf breads is confined largely to the production of luxury wheat-flour bread and to mixed wheat-and-rye bread which also includes some of the so-called "pure" rye breads. In blending with rye flour, usually only the lower grades of wheat flour are used. The percentage of wheat flour used in such

blends varies according to the quality and type of bread demanded by the consumer, and, to some extent, according to the price of wheat flour in comparison with rye-flour price. In these countries wheat requirements may vary considerably from year to year. If the domestic wheat crop is low and the rye crop is good, wheat consumption is likely to be considerably reduced because in these countries the shift from wheat to rye is accomplished more readily than in countries in which the people have a decided preference for pure wheat-flour bread.

Economic conditions in most European countries have for several years been such as to necessitate an increase in domestic-wheat production as a means for reducing expenditures for foreign supplies and for relieving the unemployment situation. Moreover, the great shrinkage in international trade in industrial products in recent years has made it impossible for the industrial nations to maintain budgetary and currency stability without drastic curtailment in importations of agricultural as well as industrial materials and products. On the other hand, the reduction in value of agricultural products has reduced the income of the overseas exporting countries, with the result that they in turn have had to curtail their purchases of European industrial products.

This vicious cycle, tending toward further reductions in international trade, has been of deep concern, not only to wheat-surplus countries, but to industrial countries as well. Efforts have been made to stop this downward trend in trade, but they have met with little success. While deficit-producing countries on the one hand have felt impelled to adopt measures to aid or encourage domestic production, the surplus-producing countries throughout the world and some deficit-producing countries have found it necessary to give serious consideration to the reduction of wheat production to a point consistent with market demands, and in a few instances definite steps have been taken to effect a reduction. The tendency of the times appears to be toward self-sufficiency of production in all goods needed for domestic consumption, especially in the case of wheat. This is impossible in some countries. Nevertheless, in recent years each country has been striving toward this end, almost to the full extent of its ability.

War has a material effect on requirements, as was evidenced by the World War, especially as regards those combatant countries which were in a position to obtain foreign supplies of grain and which did not have land resources for increased production.

Since wheat is probably the most essential food, from the double standpoint of usefulness and nutrition, nations that live in fear of war give serious consideration to the production of this grain. Countries that are incapable of producing anywhere near their own requirements of wheat, and that are so located that their outside sources of supply might be cut off, keep large stocks of wheat on hand to insure against serious shortage in the food supply in time of war. But in countries that have land resources sufficient for their wheat requirements, self-sufficiency in wheat production is encouraged without much regard to the economics of the question. Thus, until the danger of war is eliminated from the minds of European people, the production of wheat in European countries will not be considered purely from the standpoint of economics.

Frequently two or more countries enter into special trading agreements regarding the importation of wheat and flour. These agreements represent preferential treatment of some sort, sometimes through tariffs, sometimes by the establishment of import quotas, and sometimes by the actual barter of goods. Such trading relationships definitely affect import requirements in that they predetermine the country from which the importations are made. This, in the case of wheat, fixes a limitation on quality in accordance with the characteristics of the wheat produced in the exporting country.

EUROPEAN BREAD-GRAIN PRODUCTION

A clear understanding of European wheat requirements is impossible without some consideration of domestic production of wheat and other bread grains. Certainly wheat utilization, which to a very great degree constitutes wheat requirements, is greatly influenced by domestic production (figs. 8 and 9). If an abundance of wheat is produced,

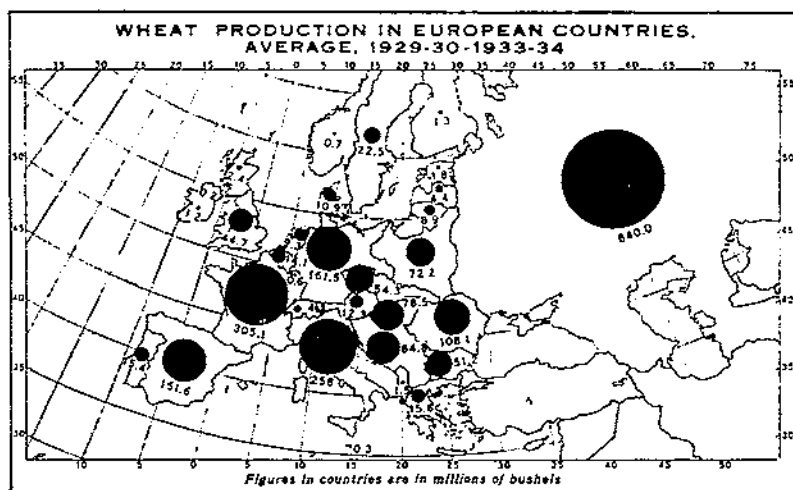


FIGURE 8.—Union of Soviet Socialist Republics, France, Italy, Germany, and Spain lead in wheat production, in the order named.

uses will be found for it which under conditions of scarcity would be filled by other grains. In countries that are deficient in wheat production, it frequently happens that the utilization of wheat is restricted almost solely to human consumption, and, if domestic production of other grains is relatively high, even its utilization for human consumption may be somewhat restricted, or it is superseded by one of these other grains. Especially is this true among countries of a relatively low standard of living.

Domestic production has an important effect on the importation of wheat as to both quantity and quality. Its effect, however, is an inverted one; that is, other conditions remaining normal, any increase in the quantity or improvement in the quality of the domestic crop will result in a proportional decrease in the quantitative and qualitative requirements for foreign wheat. As stated previously, except in the Union of Soviet Socialist Republics and a few of the Balkan

countries, most of the wheat produced in Europe is of the soft, weak sort. In fact, much of it is of such weak quality as to be unsuitable for bread production if used only by itself. There are, however, some

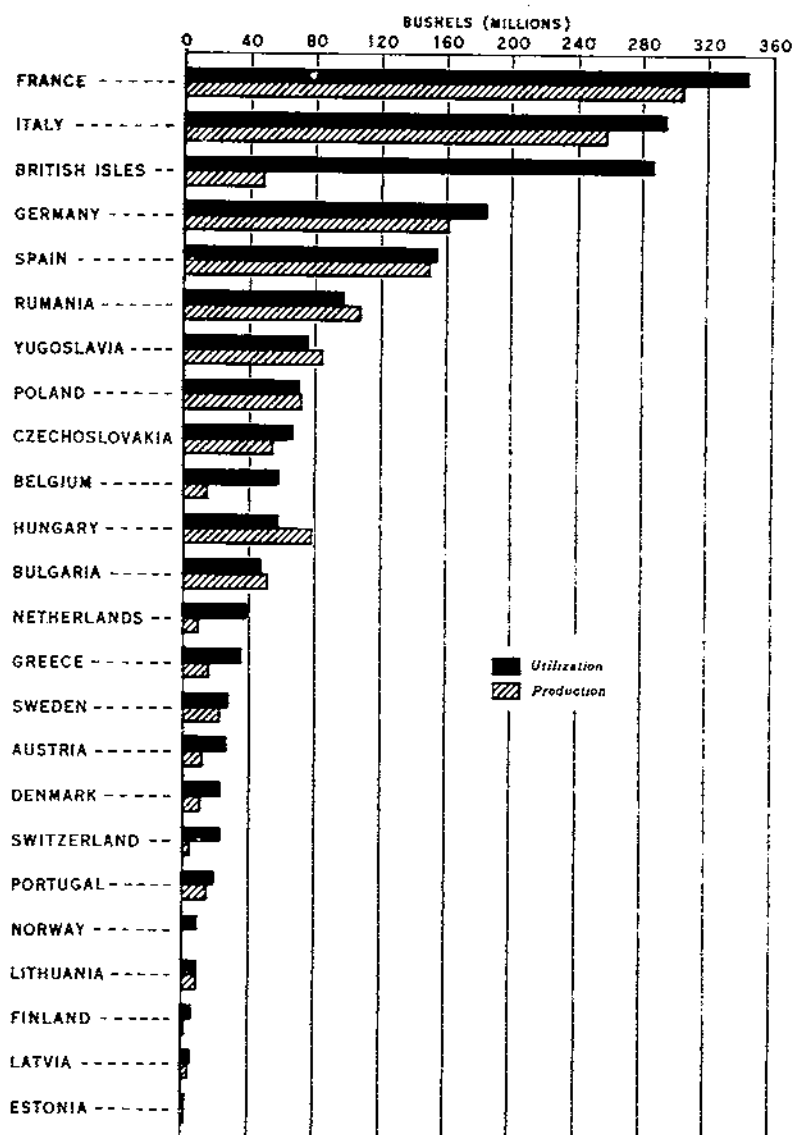


FIGURE 9.—COMPARISON OF WHEAT PRODUCTION AND UTILIZATION IN 24 EUROPEAN COUNTRIES, AVERAGE 1929-33.

Production exceeded utilization in only six of the countries. The countries with the largest production deficits were the British Isles and Belgium, whereas those with the largest production surpluses were Bulgaria, Hungary, and Rumania.

baking uses, as for instance cake and biscuit, for which weak wheats are especially suitable, but the quantity required for these uses is proportionately small. In practically all of the European countries,

except possibly one or two, domestic production of weak wheats is more than sufficient for any such requirements; consequently, the foreign wheats needed are mainly of the strong sort. Only in those countries that import wheat for feeding purposes or that import the greater proportion of their requirements of wheat for bread flour is there a market for foreign wheats of weak quality. Many European countries including both deficit- and surplus-producing countries export some of the weak domestic wheats and then import high-quality foreign wheats to take their place.

In Europe, as in other parts of the world, wheat production is dependent upon the acreage planted and the effect upon yield of such factors as climatic conditions, soil fertility, farming operations, plant diseases, and insect infestations. Climatic conditions in Europe are generally well suited to the production of wheat and rye, but soil fertility in many sections particularly of northern Europe is suitable only for rye. The methods of farming in almost all of the countries are expensive—if not in terms of money, at least in terms of human energy. Hand methods of harvesting are still largely employed in most countries and tractors for plowing the ground for wheat and rye are uncommon. Horses are generally used for plowing, but it is not uncommon to see cows or oxen so used; in fact, this is the prevalent method among the peasant farmers in certain sections.

In recent years in most European countries governmental assistance has been given to the wheat producer. The assistance has taken various forms, including free seed, the payment of premiums for increased production, the maintenance of low prices for fertilizers, restrictions on the importation and use of foreign wheat and flour, and support or maintenance of domestic wheat prices above the world market price. In some instances the motive behind these schemes of assistance has been not only to improve the individual farmer's condition, but also to benefit the country as a whole.

On the other hand, a few of the countries—France, Netherlands, Belgium, and the United Kingdom—although continuing to give assistance to the wheat farmers, have found it necessary to discourage further increases in acreage by some form of penalty or cessation of benefits.

QUANTITY OF WHEAT AND RYE PRODUCED

Bread-grain production in Europe, exclusive of Union of Soviet Socialist Republics, averaged for the 5-year pre-war period, 1909-13, 1,346,000,000 bushels of wheat and 978,000,000 bushels of rye (tables 4 and 5, and fig. 10). Although complete data are not available, it is certain that during the period of the World War the European production of these grains declined very considerably. In the first year of the post-war period wheat production amounted to 883,000,000 bushels. The next year, 1920, its production rose to 947,000,000 bushels, marking an upward trend which in the year 1933 reached the high point of 1,750,000,000 bushels, which is 404,000,000 higher than the 1909-13 pre-war average. The countries showing recently the greatest increases in wheat production are Finland, Estonia, Latvia, Sweden, Lithuania, and Norway. These countries are very small producers of wheat; consequently, the increases although large in terms of percentages, are relatively small in terms of bushels, but

there is considerable significance in the fact that all of these countries have been predominantly rye-consuming countries.

Rye production also increased during the post-war period, rising from 766,000,000 bushels in 1921 to 1,003,000,000 in 1933; the latter figure represents an increase of 25,000,000 bushels over 1909-13 pre-war average production. These figures are of double significance: The pre-war basis of production has been passed, and the trend toward increased production is much more marked in the case of wheat than rye.

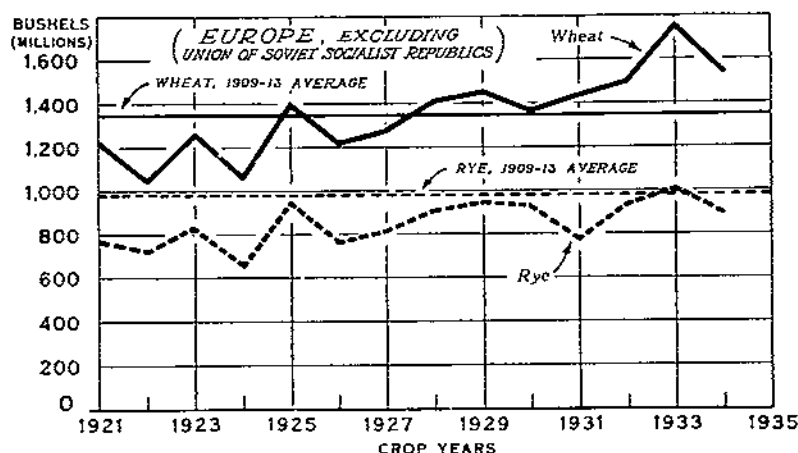


FIGURE 10.--WHEAT AND RYE PRODUCTION IN EUROPE (EXCLUDING UNION OF SOVIET SOCIALIST REPUBLICS), AVERAGE 1909-13, ANNUAL 1921-34.

The production of both wheat and rye has increased rapidly since 1921, the increase of wheat being the greater.

TABLE 4.—Estimated European¹ acreage, production, yield per acre, net imports, and apparent utilization of wheat, and estimated population, average 1909-13, 1919-23, 1924-28, 1929-33, annual 1919-34

Year	Acreage harvested	Production	Yield per acre	Net imports, including flour ²	Apparent utilization ³		Estimated population
					Total	Per capita	
	Million acres	Million bushels	Bushels	Million bushels	Million bushels	Bushels	Millions
Average 1909-13	72.8	1,346	18.5	407	1,753	5.7	305
1919	53.3	883	16.6	597	1,380	4.1	341
1920	60.2	947	15.7	568	1,515	4.4	344
1921	61.2	1,224	19.1	524	1,748	5.1	346
1922	65.2	1,045	16.0	555	1,600	4.6	351
1923	66.1	1,257	19.0	560	1,817	5.1	354
Average	61.8	1,071	17.3	543	1,614	4.7	347

¹ Europe as a whole except Union of Soviet Socialist Republics and Turkey. Not to be confused with summary tables for 24 European countries which appear in the appendix.

² Estimated by Food Research Institute for years beginning Aug. 1. Net imports of deficit countries minus net exports of Bulgaria, Hungary, Rumania, and Yugoslavia.

³ Stocks disregarded at beginning and end of periods.

⁴ Data nearest 1911.

⁵ Wheat studies of Food Research Institute.

⁶ Rough estimate.

⁷ *Aperçu annuel de la démographie des divers pays du monde, 1922*; European total excluding Union of Soviet Socialist Republics, Turkey, and certain minor divisions.

TABLE 4.—Estimated European acreage, production, yield per acre, net imports, and apparent utilization of wheat, and estimated population, average 1909-13, 1919-23, 1924-28, 1929-33, annual 1919-34—Continued

Year	Acreage harvested	Production	Yield per acre	Net imports, including flour	Apparent utilization		Estimated population
					Total	Per capita	
	Million acres	Million bushels	Bushels	Million bushels	Million bushels	Bushels	Millions
1924.....	67.4	1,558	15.7	994	1,062	4.7	357
1925.....	69.3	1,597	20.2	477	1,874	5.2	360
1926.....	70.0	1,516	17.4	634	1,850	5.1	363
1927.....	71.3	1,273	17.9	624	1,898	5.2	366
1928.....	71.4	1,410	19.7	630	2,040	5.5	369
Average.....	69.9	1,271	18.2	594	1,865	5.1	369
1929.....	70.2	1,451	20.7	440	1,900	5.1	371
1930.....	73.7	1,361	18.5	563	1,921	5.1	374
1931.....	76.0	1,436	18.9	624	1,960	5.2	377
1932.....	75.4	1,492	19.8	420	1,921	5.1	380
1933.....	77.9	1,750	22.4	351	2,101	5.5	383
Average.....	74.6	1,498	20.1	463	1,961	5.2	377
1934.....	77.5	1,536	19.8	328	1,861	4.8	385

* Preliminary.

Compiled by the Foreign Agricultural Service Division. Acreage and production data from Division of Statistical and Historical Research except as noted.

TABLE 5.—Estimated European¹ acreage, production, yield per acre, net imports, and apparent utilization of rye, and estimated population, average 1909-13, 1919-23, 1924-28, 1929-33, annual 1919-34

Year	Acreage harvested	Production	Yield per acre	Net imports, including flour ²	Apparent utilization ³		Estimated population
					Total	Per capita	
	Million acres	Million bushels	Bushels	Million bushels	Million bushels	Bushels	Millions
Average 1909-13.....	45.2	978	21.6	1	970	8.2	365
1910 ⁴							
1920 ⁵							
1921.....	37.8	766	20.3	(9)	(9)	(9)	351
1922.....	40.4	720	17.8	69	789	2.2	351
1923.....	41.3	832	20.1	76	908	2.6	354
Average.....							
1924.....	39.9	659	16.4	60	715	2.0	357
1925.....	42.9	947	22.1	26	973	2.7	360
1926.....	42.6	763	17.9	44	807	2.2	363
1927.....	42.2	813	19.3	55	868	2.4	366
1928.....	40.7	905	22.2	20	925	2.5	369
Average.....	41.7	817	19.6	41	858	2.4	369
1929.....	42.0	940	22.4	10	950	2.6	371
1930.....	42.8	924	21.6	22	946	2.5	374
1931.....	41.0	776	18.9	46	822	2.2	377
1932.....	40.7	932	22.9	28	960	2.5	380
1933.....	41.6	1,063	24.1	42	1,091	2.6	383
Average.....	41.6	915	22.0	21	936	2.5	377
1934.....	40.9	895	21.9	1	896	2.3	385

¹ Europe as a whole except Union of Soviet Socialist Republics and Turkey. Not to be confused with summary tables for 21 European countries which appear in the appendix.² Total imports less exports for European countries reporting. Flour converted to grain on basis of 6 bushels per barrel.³ Stocks disregarded at beginning and end of periods.⁴ Date nearest 1911.⁵ Not available.⁶ Net exports.

Compiled by the Foreign Agricultural Service Division. Acreage, production, and import figures from the Division of Statistical and Historical Research.

For a number of years following the close of the World War the acreage of both wheat and rye harvested in Europe (except Union of Soviet Socialist Republics) and the outturn or acreage yield of these grains was lower than for the period immediately preceding the war but within recent years both wheat acreage harvested and yield per

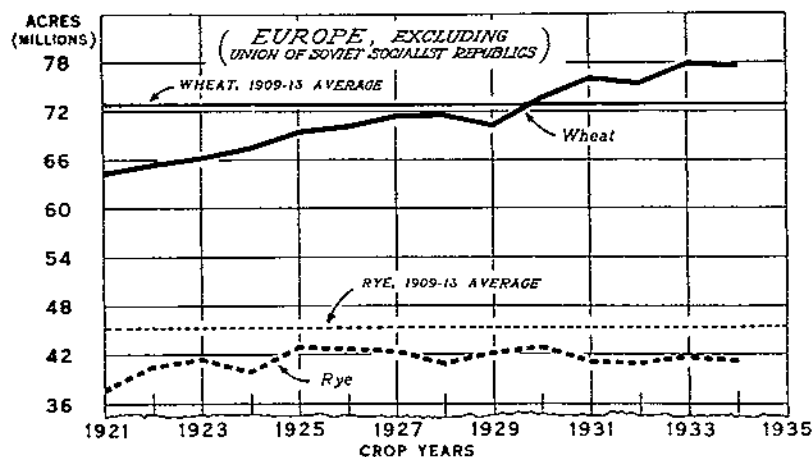


FIGURE 11.—WHEAT AND RYE ACREAGE IN EUROPE (EXCLUDING UNION OF SOVIET SOCIALIST REPUBLICS), AVERAGE FOR 1909-13, ANNUAL 1921-34.

Wheat acreage has shown a consistent and rapid upward tendency since 1921. The rye acreage has increased only slightly.

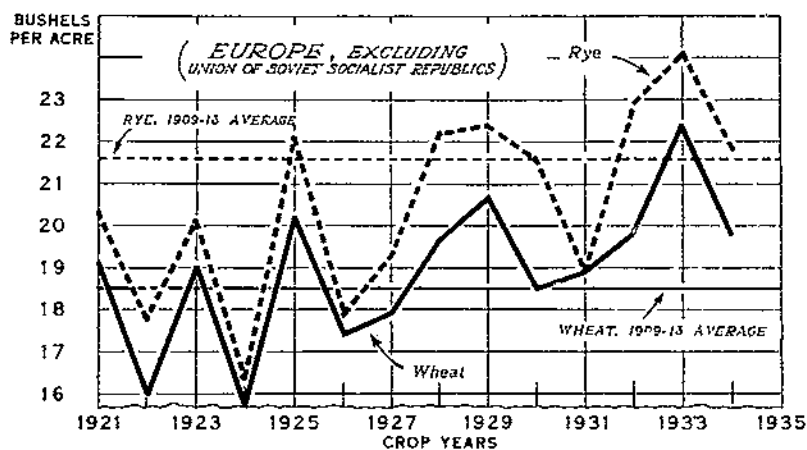


FIGURE 12.—YIELD PER ACRE OF WHEAT AND RYE IN EUROPE (EXCLUDING UNION OF SOVIET SOCIALIST REPUBLICS), AVERAGE FOR 1909-13, ANNUAL 1921-33.

For both grains the yield per acre has tended upward. Greater increases have occurred in rye than in wheat.

acre have risen well above the pre-war level. The same is true for rye with respect to acreage yield but not with respect to acreage harvested (figs. 11 and 12).

Compared with the 1909-13 average the seven European countries which in the 5-year period, 1929-33, showed the greatest percentage

increases in wheat acreage harvested were Finland, Estonia, Sweden, Latvia, Norway, Lithuania, and Denmark, all of which are predominantly rye-bread-eating countries (see table 78). The percentage increase for these seven countries ranged from 65.6 to 562.5 percent. Twelve other countries showed increases ranging from 2.4 to 56.5 percent, while only five European countries showed any decrease.

In 16 of 24 European countries considered, higher wheat-acreage yields were obtained during the 1929-33 period than during the 1909-13 pre-war period while in only 7 of the countries were lower yields obtained (fig. 13). One country showed no change in yield. The two countries showing the greatest increases were Finland and Italy, these increases being 48.0 and 37.2 percent, respectively. The two countries showing the greatest decrease were Greece and Rumania. The average yields obtained for the various countries during the 1929-33 period ranged from 10.6 bushels per acre in the case of Greece to 43.0 bushels in the case of the Netherlands.

WHEAT DEFICIT- AND SURPLUS-PRODUCING COUNTRIES

In table 98 data are presented showing for 24 European countries the average annual wheat deficit, or surplus, as the case may be, of each during the three periods 1909-13, 1924-28, and 1929-33. (See table 99 for similar data regarding rye.) The deficits and surpluses shown represent the difference between production and consumption, the latter being determined by adding net imports to production, and in the case of surplus countries by subtracting net exports from production.

For the 1929-33 period, 18 of the countries showed production deficits and 6 showed production surpluses. The total of average annual deficits for that period amounted to 516,705,000 bushels while the total of surpluses amounted to 47,949,000 bushels. Compared with the totals for the 1924-28 period, the figures just given represent a reduction of about 106,000,000 bushels in production deficits and an increase of 12,000,000 bushels in production surpluses. This means that European (except Union of Soviet Socialist Republics) annual requirements for wheat from other parts of the world decreased between the 1924-28 and 1929-33 periods by the sum of these two amounts or approximately 118,000,000 bushels. Among the production-deficit countries, the British Isles has by far the largest deficit; it accounts for almost one-half of the total European deficits. Among the other deficit countries in the 1929-33 period Belgium, France, Italy, Netherlands, and Germany had the highest deficits.

The deficit in the British Isles has consistently increased since pre-war times. This increase in combination with the substantial decrease in the total of European deficits has greatly magnified the relative importance of the deficit in the British Isles. Compared with the 1924-28 period the deficits of Italy, Germany, and France have been substantially reduced; especially is this true of the former two countries.

The countries that had an average annual surplus in wheat production during the period 1929-33 were, in the order of their importance, Hungary, Rumania, Yugoslavia, Bulgaria, Poland, and Lithuania.

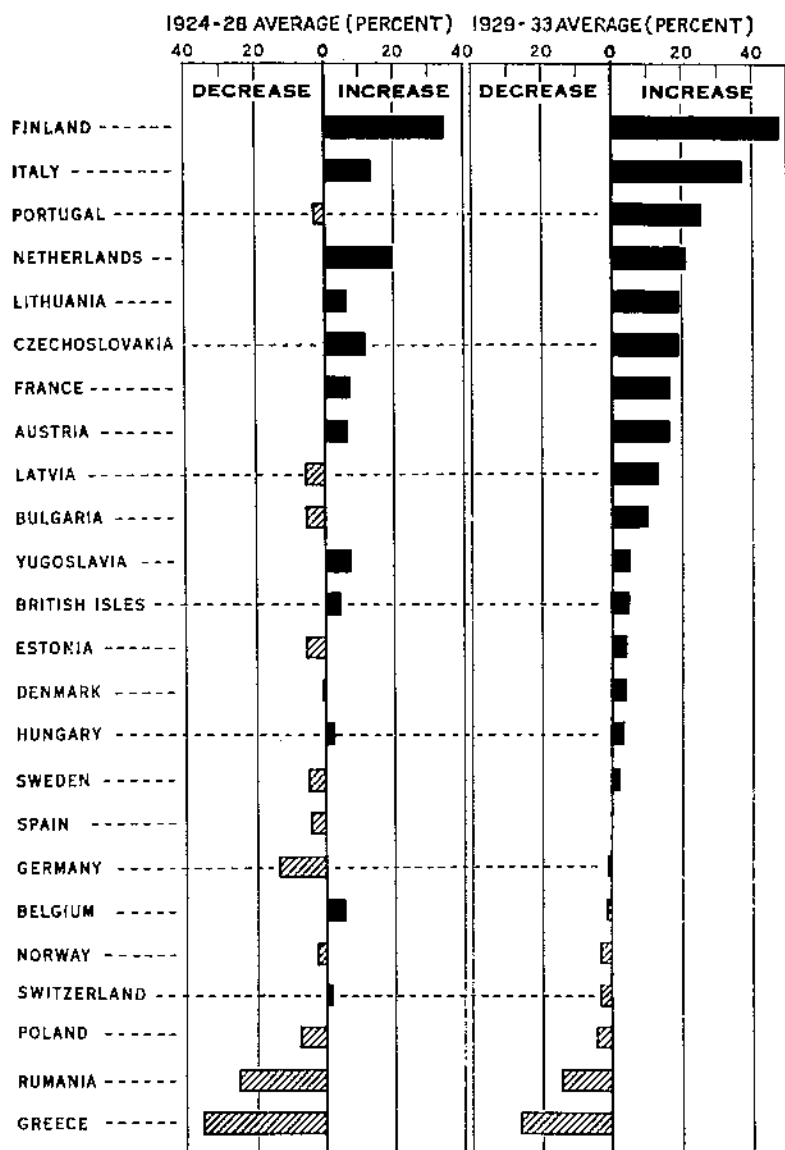


FIGURE 13.—WHEAT YIELD PER ACRE IN 24 EUROPEAN COUNTRIES, THE INCREASE OVER OR DECREASE FROM THE 1909-13 AVERAGE FOR THE PERIODS 1924-28 AND 1929-33.

Finland, Italy, and Portugal show highest increases. Rumania and Greece show the greatest decreases in yield.

RYE DEFICIT- AND SURPLUS-PRODUCING COUNTRIES

The wheat requirements of those European countries in which considerable quantities of rye bread are consumed are likely to be affected by rye production. Whenever a large crop of rye is produced in a country deficient in wheat production, there will be a tendency for the domestic trade to substitute the former grain for the latter. This tendency will be more pronounced in periods of depression than in periods of prosperity. There will also be a similar tendency for wheat utilization to increase in rye-bread-consuming countries in years of low rye production. It will matter little whether the domestic production of wheat is below or above domestic requirements except that the tendency to increased utilization of wheat under such circumstances will be most pronounced in wheat-surplus countries. The European countries included in this study which are predominantly rye-bread-consuming countries are Lithuania, Poland, Estonia, Latvia, Denmark, Czechoslovakia, Germany, Finland, and Norway.

PER-CAPITA UTILIZATION OF WHEAT AND RYE

Data are presented in figure 14 and table 92 showing that France, Bulgaria, Belgium, and Italy were the European countries that had the highest per-capita utilization of wheat in the 1929-33 period and Finland, Estonia, and Poland had the lowest. In respect to rye, the countries of highest per-capita utilization were Lithuania, Poland, Estonia, and Latvia, and the countries of lowest per-capita utilization, the British Isles, Italy, and Greece. Wheat per-capita utilization for this period ranged from 1.6 to 8.3 bushels (96 to 498 pounds) and rye per-capita utilization from 0.02 to 9.0 bushels (2 to 504 pounds) per annum.

Data are also presented (fig. 14 and table 92) for the periods 1909-13 and 1924-28. Comparison of the per-capita utilization given for these two periods shows for both wheat and rye in a majority of the countries a very marked reduction during the latter period, but comparison of per-capita utilization of the 1929-33 period with that of the 5-year period, 1924-28, shows slight increases in a majority of the countries.

The reader is reminded, however, that the data referred to above are open to the criticism that differences in carry-overs at the beginning and end of the periods in question have not been taken into account. But considering that the difference between stocks at the beginning and end of the 5-year periods in question must be divided by five, failure to take into account this difference could acquire some significance only in exceptional cases. The 5-year period 1929-33 happened to be just such an exception for in that period there was a succession of several unusually good crops. This undoubtedly resulted in an abnormal accumulation of bread-grain stocks in a number of European countries which probably accounts for some of the increases in per-capita utilization shown for that period.

SHARE OF WHEAT AND RYE IN TOTAL BREAD-GRAIN PRODUCTION AND REQUIREMENTS

In total production of wheat and rye in the various countries of Europe (except Union of Soviet Socialist Republics) the proportion or percentage represented by wheat for the period studied is lowest in

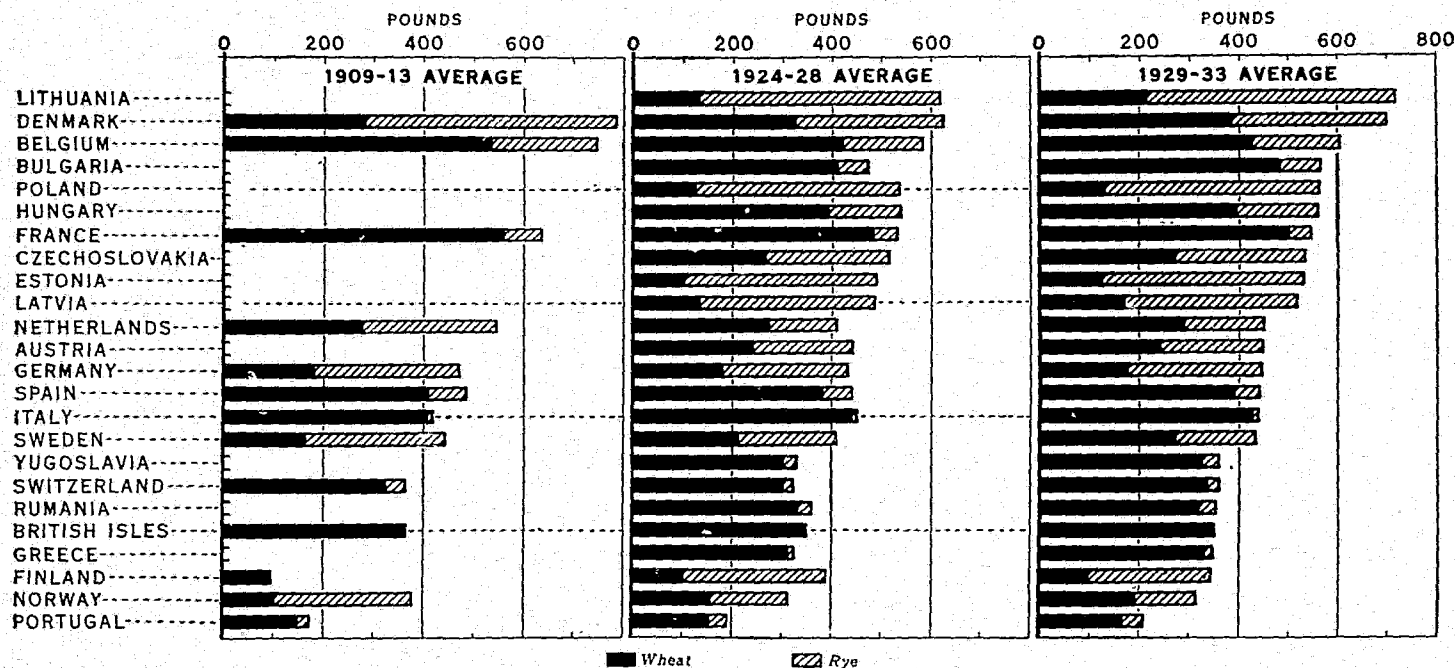


FIGURE 14.—APPARENT PER-CAPITA UTILIZATION OF WHEAT AND OF RYE IN 24 EUROPEAN COUNTRIES. AVERAGE 1909-13, 1924-28, AND 1929-33.

Lithuania, Denmark, and Belgium averaged the highest in apparent per-capita utilization of wheat and rye combined, and Portugal the lowest. Generally the countries of high per-capita utilization were heavy users of both wheat and rye. (Utilization based on production plus imports minus exports, carry-overs disregarded.)

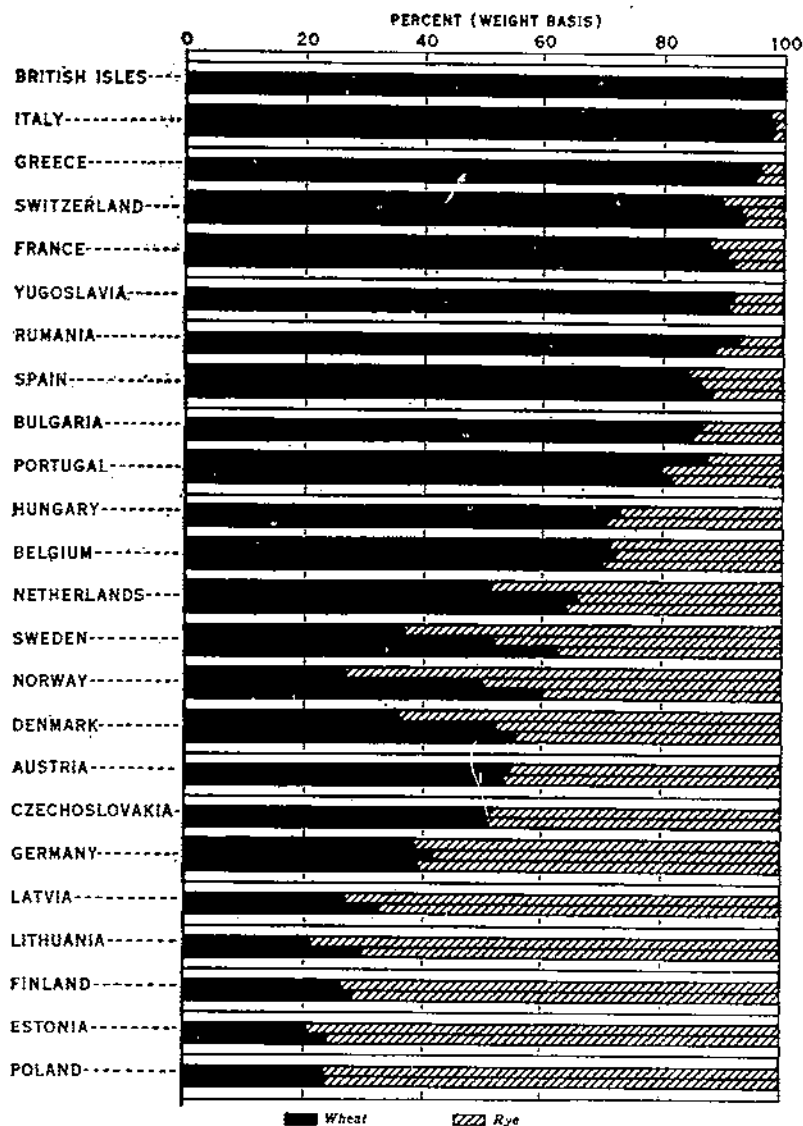
Finland, Estonia, Poland, Latvia, and Lithuania and highest in the British Isles, Italy, Yugoslavia, France, Greece, and Rumania (fig. 15). On the basis of averages for the three 5-year periods, 1909-13, 1924-28, and 1929-33, the percentages ranged from 1.4 for Finland during the 1909-13 period to 98.5 for the British Isles during the 1929-33 period. Besides showing that rye production predominates in Austria, Netherlands, Belgium, Czechoslovakia, and the Scandinavian and Baltic countries and wheat production in the other countries of Europe, certain graphs presented in figure 15 also show for a majority of European countries a definite, and in some cases, a very marked increase in the proportion of wheat production since 1909-13. The three countries showing the greatest increases in the proportion of wheat produced were Norway, Sweden, and Denmark. If these trends are studied in the light of the actual quantities of wheat and rye produced, it will be seen that the increases in proportion of wheat were more often due to the increased production of wheat rather than to any decrease in the production of rye.

The proportionate requirements of utilization of wheat and rye for all purposes (seed, feed, food, and loss) in the various European countries are graphically presented in figure 16, using yearly averages for the periods 1909-13, 1924-28, and 1929-33. The countries in which the proportion of wheat requirements compared with rye requirements for domestic use is highest are the British Isles and Italy while the countries in which it is lowest are Poland, Estonia, Finland, Lithuania, and Latvia. The range in wheat percentages is from 20.4 for Estonia during the period 1924-28 to 99.6 for the British Isles during the 1929-33 period.

Comparison of the graphs for the three periods 1909-13, 1924-28, 1929-33, shows for several of the countries a marked increase since 1909-13 in the share of wheat in total bread-grain requirements. The countries showing the most notable increases were Norway, Sweden, and Denmark. On the other hand, instances are shown in which the proportion of wheat in total bread-grain requirements has decreased in recent years, in favor of rye, but these decreases were not so marked as were the increases cited above.

GOVERNMENT REGULATIONS AFFECTING THE WHEAT-REQUIREMENT SITUATION

In all the countries of Europe governmental regulations or laws are in effect which either directly or indirectly hinder international trade in wheat and flour. The hindrance to foreign trade from this source has greatly increased in recent years owing to the widespread economic depression and the growing spirit of nationalism. Most governments have taken drastic steps to favor the domestic producers of wheat as against the foreign producers. Several methods of approach to the problem of helping home industry have been used. These include tariffs, quotas, prohibitions, and other forms of restrictions placed on imports of wheat and flour; subsidies or bounties paid on exports; subsidies paid to producers; price fixing and price manipulation; prohibitions placed on the use of foreign wheat through limitation of the percentage that may be included in milling mixtures; and limitations on the percentage of flour that may or must be extracted.



First bar = 1909-13 Second bar = 1924-28 Third bar = 1929-33

FIGURE 15.—SHARE OF WHEAT AND OF RYE IN TOTAL BREAD-GRAIN PRODUCTION IN 24 EUROPEAN COUNTRIES, 1909-13, 1924-28, AND 1929-33.

Many countries show a considerable increase in the proportion of wheat produced. Only a few countries show any increase in the proportion of rye produced, and in none is the increase very considerable. (Blank bars indicate that data for that period are not available.)

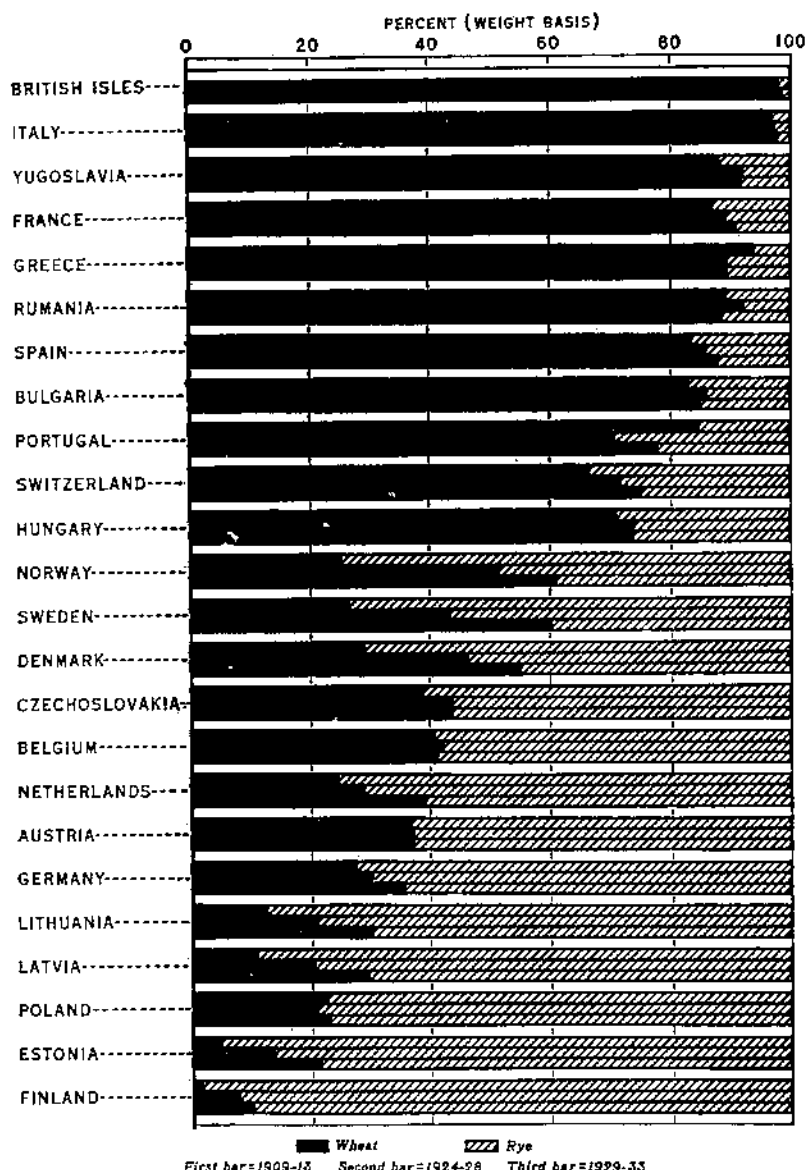


FIGURE 16.—SHARE OF WHEAT AND OF RYE IN TOTAL BREAD-GRAIN UTILIZATION IN 24 EUROPEAN COUNTRIES, AVERAGE 1909-13, 1924-28, AND 1929-33.

In several of the predominantly rye-consuming countries the proportion of wheat utilized has increased considerably. Only a few of the countries show any increase in the proportion of rye consumed and in none is the increase significantly large. (Blank bars indicate that data for that period are not available.)

Never in the history of the world have there been so many barriers to international trading in wheat and flour as at the present time. The outstanding measures adopted in each country will be mentioned in the coming discussion of that country.

GENERAL CONCLUSIONS REGARDING FACTORS AFFECTING THE FUTURE EUROPEAN DEMAND FOR WHEAT

Considered from the standpoint of long-time trends, wheat will some day become the principal and predominating grain for use in the production of bread in practically all European countries.

Wheat production in most western and central European countries has increased during recent years beyond the upper limits of the market requirements for wheat of the kind and quality grown in these countries. This situation has resulted in a deterioration in the quality of the common breads.

With any improvement in economic conditions or in the political situation which will permit a slackening in present restrictions on the use of foreign wheat, there will be a tendency in some of the countries for wheat production to decrease because in most of them the domestic crop is of a lower quality than is desired for bread-baking purposes. Except in the Danube Basin and the Union of Soviet Socialist Republics, European wheats are predominantly weak in quality and need the admixture of a considerable quantity of high-protein foreign wheat in order to produce a flour from which bread of satisfactory quality can be made.

Much work is being done in most of the European countries to improve the quality of domestic wheat. Some improvement has been made and more will follow, but on account of unfavorable climatic conditions it is doubtful whether western European countries can ever reach a self-sufficiency status as regards quality.

The author is of the opinion that in nearly all European countries the consumption of bread is declining and that in many of them, particularly those that have a low standard of living, the extent of the decline in future years is likely to be considerable, depending on what progress is made in raising the standard of living. Increases in bread consumption are likely to occur only in one or two sections where living standards at present are little above a starvation basis. Even then the increases will come only through an improvement in living standards which, if improved beyond a certain point, will in turn probably result in a decline in bread consumption. Among the countries possibly only in Great Britain has bread consumption reached that stage in its development approaching stabilization.

The quality requirements for foreign wheat in European markets will tend toward higher levels in the future. In other words, the demand for strong-quality wheats will be even more insistent than in the past, with the result that price differences on account of quality will be more marked. The change to mechanized bread production now taking place in many sections will certainly bring about an increased demand for stronger wheats. In the case of machine-produced breads, the baking procedure used cannot be altered to nearly so great an extent or so readily as in the case of hand methods of baking; consequently, the flour used must be more uniform in quality and of greater gluten strength in order to stand more mistreatment than formerly. It is generally conceded by European

millers and bakers that of the wheats of the world North American high-protein-content hard wheats possess the greatest degree of dependability in baking and therefore are given preference over all others.

Most of the countries have sufficient or more than sufficient milling capacity for domestic needs. The governments of the few nonself-sufficient countries, through discriminatory measures against imports of flour and by encouragement and assistance given to home industry, are rapidly increasing their respective capacities to the point that in the near future the import demand for flour will be practically negligible.

The long-time demand outlook for hard red winter wheat, the principal type exported from the United States in the past, will be favorable, providing its price is lowered to that of wheats of similar quality from other exporting countries. Although the import demand for bread wheats, in recent years, has been considerably reduced by the milling restrictions placed on the use of foreign wheat in many of the leading wheat-importing countries, the reduction in demand has been chiefly for the soft types of wheat. Wherever there is a market for bread wheats, hard red winter, because of its desirable milling and baking qualities, will be given favorable consideration along with Canadian and Argentine wheats, provided it is offered at a somewhat similar price.

The demand outlook for United States Pacific Northwest white wheat is not very promising. Only in the Irish Free State is white wheat especially desired; the other European countries have little real need for it. If the United States is to find a foreign market for this type of wheat, it will probably have to look to the Orient.

The demand outlook for durum wheat offers possibilities not enjoyed by other types for it is produced in only three or four of the countries but is needed in all of them for the production of semolina alimentary pastes. The demand for this wheat, although not great, should continue to be steady.

REQUIREMENT SITUATION IN INDIVIDUAL COUNTRIES

In the pages that follow, certain phases of the wheat and bread situation in Europe will be dealt with by individual countries. Data will be presented showing the production and consumption of both wheat and rye, and the quantities of these grains imported and exported. In addition to the statistical data, information will be presented in regard to the quality of domestic wheats, the quality of foreign wheat needed to supplement the domestic product, milling practices, baking practices, and dietary habits as related to bread-grain consumption. This information, in most instances, represents the writer's personal observations and investigations. Except in the case of statistics, no attempt has been made to present either a partial or a complete compilation of available literature on the various subjects mentioned.

It should be understood that the data presented for apparent consumption do not take into account differences in crop carry-overs—in fact, no consideration is given to carry-overs. The figures given are obtained, in the case of deficit countries, by adding net imports to production and, in the case of surplus countries, by subtracting net exports from production. The resulting figure, although intended to represent

utilization for all purposes (including seed, food, feed, and loss) is inaccurate to the extent of the difference between stocks of grain on hand at the beginning and at the end of the year. Wide differences in stocks often occur between these dates, especially when one extreme in production follows another; therefore, if comparisons are made on a yearly basis, wide discrepancies may occur in apparent consumption figures obtained by the above method. But owing to the fact that the differences in carry-overs that occur from year to year are sometimes negative and sometimes positive, these differences tend to cancel out when the consumption figure covers a period of years, and the average thus obtained becomes a fairly accurate representation of consumption. In order that errors resulting from the failure to take into account carry-over differences may be partially eliminated, the consumption data presented in the following pages are on the basis of 5-year averages.

BELGIUM

Belgium is the most densely populated country in Europe. Nearly 8,250,000 people inhabit this country, which has an area of only 11,744 square miles; in other words, it is smaller than the State of Maryland. The bread most commonly consumed by the Belgian people is made from wheat flour.

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

The annual production of wheat in this country at the present time amounts to about 14,000,000 bushels and rye production to about 21,000,000 bushels (tables 6 and 7). Present annual consumption of these grains amounts to about 58,000,000 bushels of wheat and 26,000,000 bushels of rye, which means that domestic production is deficient in the case of wheat to the extent of about 44,000,000 bushels and in the case of rye to the extent of about 5,000,000 bushels. Since the pre-war period, 1909-13, wheat production has declined approximately 1,000,000 bushels and rye production about 3,000,000 bushels. Likewise, consumption of these grains has declined since pre-war times, but in this instance the decline was greater in wheat than in rye.

TABLE 6.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Belgium, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production	Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter wheat	Spring wheat	Total			Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:											
1909-13.....			404	15,189	37.6	72,877		121,965		66,111	8.9
1924-28.....	368	4	372	14,755	39.7	42,624	895	1,050	2,138	55,086	7.0
1929-33.....	376	5	381	14,144	37.1	46,576	565	3,329	313	57,643	7.1
Annual:											
1929.....	346	10	356	13,225	37.1	43,148	1,393	1,360	658		
1930.....	409	2	411	13,236	32.2	47,715	529	2,633	477		
1931.....	375	6	381	13,817	36.3	54,196	131	6,530	203		
1932.....	363	3	366	15,376	39.8	44,762	148	3,717	130		
1933.....	366	6	372	15,067	40.5	43,060	623	2,406	96		
1934.....	378	7	385	14,322	37.2	42,463	378	2,984	108		

¹ Year beginning July 1.

² Converted to grain on the basis of 4.5 bushels per barrel of flour.

³ Stocks at the beginning and end of periods are disregarded.

⁴ Includes flour in terms of grain.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 7.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Belgium, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
Average:	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>Bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>Bushels</i>
1909-13.....	672	23,044	35.2	5,755	830	28,560	3.8
1924-28.....	567	21,408	37.9	1,829	210	22,517	2.9
1929-33.....	561	21,440	38.2	5,358	310	26,388	3.2
Annual:							
1929.....	567	22,162	39.1	1,621	15		
1930.....	574	18,629	32.5	6,301	210		
1931.....	549	20,482	37.3	4,875	1,030		
1932.....	502	23,062	42.1	4,956	720		
1933.....	554	22,310	40.3	9,057	91		
1934.....	514	20,802	38.2	3,278	25		

¹ Year beginning July 1; flour included, converted on basis of 6 bushels of grain per barrel of flour.² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

IMPORTS AND EXPORTS OF WHEAT AND FLOUR

Annual imports of wheat during the 5-year period 1929-33 averaged 46,576,000 bushels, and annual exports of wheat during the same period averaged 3,329,000 bushels. These averages represent, in the case of imports, an increase of about 4,000,000 bushels over the average for the preceding 5-year period and in the case of exports an increase of about 2,280,000 bushels. Annual imports of wheat flour, in terms of grain, during the 1929-33 period averaged only 565,000 bushels, a very insignificant quantity compared with imports of wheat. Annual exports of flour, in terms of grain, during the same period averaged 313,000 bushels, which is in marked contrast to an export average of 2,138,000 bushels for the 5-year period 1924-28. Before the World War flour exports were even considerably higher than the 1924-28 average. At that time Belgian mills sold considerable quantities of flour to the Netherlands and the Scandinavian countries. This trade was lost at the outbreak of the war and has never been regained.

Belgium imports wheat in considerable quantity from most of the surplus-producing countries of the world, but the countries that in past years have contributed the bulk of these imports are the United States, Argentina, and Canada (table 8). On the other hand, Belgium's wheat flour imports in recent years have come chiefly from the United States, France, and the Netherlands. Owing to the fact that Canadian wheat passing through United States ports is usually listed by the importing country as coming from the United States, Canada's importance as a supplier of wheat to Belgium is greater and the importance of the United States is less than would appear from the statistical data here presented.

TABLE 8.—*Belgian imports of wheat and wheat flour by country of origin, calendar years 1927-32*

Commodity and country of origin	1927	1928	1929	1930	1931	1932
Wheat:	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
United States.....	17,171	10,219	10,446	16,862	15,326	12,686
Canada.....	9,240	14,467	9,926	6,027		
Argentina.....	11,654	14,570	18,391	10,471	13,328	14,508
Bulgaria.....					2,215	1,218
Netherlands.....	2,001	2,905			1,831	1,322
Rumania.....	2,371		1,989	2,915	4,225	3,330
Russia.....				4,653	6,890	3,325
Other countries.....	2,777	1,445	2,539	3,236	2,173	9,089
Total.....	45,214	43,696	43,285	44,354	53,768	46,645
Wheat flour in terms of wheat: ¹						
United States.....	230	69	46	225	101	27
France.....	312	745	1,328	171	22	9
Netherlands.....	33	13		102	159	57
Other countries.....	20	18	41	41	70	60
Total.....	595	845	1,415	539	352	153

¹ Conversion basis, 4.5 bushels equal 1 barrel of flour.

Compiled from Belgian Year Books.

CHARACTERISTICS AND QUALITY OF BELGIAN WHEATS

Belgian wheats are of soft texture and weak quality. In protein content they range from 7 to about 9 percent (13.5-percent moisture basis). The gluten of these wheats is said to be lacking in elasticity. It has fairly good stretching properties but is deficient in resilience and contractility. The moisture content of these wheats ranges from 14 to 16 percent in dry years and from 18 to 20 in wet years.

Little work has been done in developing varieties of better milling and baking qualities. Producers are more interested in high yields than in baking quality. Most of the work on variety improvement is in the hands of private enterprise. The producers' lack of interest in quality is due to the fact that only a small percentage of the domestic wheat crop is used for milling. In years when the condition of the crop is good, 10 to 15 percent of the total production is so used and in years when the condition is bad only 5 to 10 percent. The remainder of the crop is used for feeding purposes, especially for poultry, or is exported.

GOVERNMENT REGULATIONS AFFECTING GRAIN AND MILLING INDUSTRIES

Before the World War Belgium was known as a "free trade" country, but since the war, owing to the economic depression, the Nation has adopted a number of measures in support of domestic industry. Those affecting the wheat and flour industry are as follows:

On January 20, 1930, a royal decree was issued which provided that the importation and transit of wheat and wheat flour would thenceforth be subject to a special authorization issued by the Minister of Agriculture. This measure was adopted to protect domestic producers from the dumping of wheat and flour on the Belgian market by neighboring countries. According to the provisions of this decree, permits are required for the importation of wheat, wheat flour, grits, groats, or semolina. Effective August 17, 1933, the importer has been required to pay an import license fee or tax

on imports of grain and grain products. The import tax thus collected is for distribution among domestic wheat producers.

For some time, through the medium of a Government-fostered private agreement among millers, a minimum percentage for the use of domestic wheat in milling was fixed, as was a minimum price for domestic grain. The quota of domestic wheat for use in milling first agreed to was 5 percent, but later it was changed to 20. A decree issued September 15, 1932, set up a compulsory mixing regulation requiring the use of at least 10 percent of domestic wheat in the manufacture of flour.

MILLING PRACTICES AND WHEAT PREFERENCES

In Belgium there are about 80 commercial mills and a considerable number of grist mills. The grist mills are of very small capacity and consequently of little importance. About 18 of the commercial mills have grinding capacity equal to or in excess of 1,000 quintals of grain per 24 hours. (A quintal is equivalent to 100 kg or 220 pounds.) The largest mill has a grinding capacity of 6,000 quintals per 24 hours and is located in Brussels, which is the greatest milling center of Belgium. In Brussels and its suburbs there are one mill of 6,000 quintals grinding capacity, one of 3,000 quintals, one of 2,000 quintals, and four of 500 to 600 quintals. The second greatest milling center is Antwerp and the third greatest is Ghent. The total milling capacity is said to be 60 percent in excess of requirements for domestic consumption.

All, or practically all, of the commercial mills, are members of a milling syndicate. The total grinding capacity of these syndicate mills is said to be 60,785 quintals of grain per 24 hours. Information furnished by one of the leading millers indicates that production of the syndicate mills is regulated by the Government. Each week, in accordance with the estimated requirements of the country, the Government designates the quantity that may be milled which is then apportioned to the various syndicate mills according to their grinding capacity. When a miller has milled the quantity apportioned to him he shuts down his mill until the next week's assignment is made. For the week of May 7 to 13, 1933, the quantity designated for milling was 200,000 quintals, which on the basis of the total grinding capacity of the syndicate mills was equivalent to approximately $3\frac{1}{4}$ full days' run. The mills outside of the syndicate are allowed to mill as much as they please, but as these mills are only of the grist-grinding or custom type, their production has little or no effect on commercial-flour requirements.

Very few of the milling companies employ chemists. Those employed are under contract with their employers not to give out information regarding their work and they are not permitted to show visitors through their laboratories or through the mill. The chemist's position in Belgian, as in Swedish, mills is one of considerable importance. He not only is in complete charge of the laboratory work but is in supreme command as regards manufacturing technique. The routine chemical tests employed at one of the mills visited consisted of moisture, ash, wet and dry gluten, and protein determinations on wheat, and moisture, ash, wet and dry gluten, and color-value determinations on flour. The chemist of this mill attached consider-

able importance to the difference in percentage between dry gluten content and protein content as an index to quality. He claimed that if the difference is small the quality will be better than if the difference is large. In domestic wheat the difference in percentage is much greater than in foreign hard wheats. Baking quality is tested by actual baking tests.

The grain-storage capacity of the 6,000-sack mill previously mentioned is 15,000 metric tons (550,000 bushels). This is equivalent to 25 days' grinding requirements. No data concerning the grain-storage capacity at other mills was obtained, but the writer was informed that in most instances it was much less than that of the mill cited, not only in quantity but in proportion to grinding capacity.

As a general practice Belgian millers keep their storage bins filled nearly to capacity at all times of the year. This is necessary in order that the miller may have on hand sufficient quantities of the various types and qualities of wheat to enable him to make up a blend that will suit his purposes. No old-crop wheat is stored for blending with new-crop wheat because foreign wheats are fully matured and ready for immediate use by the time they arrive at the mill. Insofar as domestic wheats are concerned, they usually constitute such a small percentage of the milling mixture that their state of maturity makes little or no difference in the baking quality of the resultant flour.

The system of milling used is similar to that employed in German mills. The cleaning equipment used includes a sufficient assortment of the various types of cleaning machines to enable the miller to separate almost any kind of foreign material that may be present. Cockle separators, oat separators, spiral separators, wheat washers, and stoners are of common occurrence in these mills. All foreign wheats are washed before milling but not all domestic wheats.

The mixture of wheats used by the Belgian millers for the production of bread flour is not what would be called a very strong mixture. It consists of both soft and hard wheats. Most any of the various types of wheat grown throughout the world can be used to a more or less limited extent in these mixtures, consequently price is an important factor in the selection made and the percentages in which the various types are used. A considerable quantity of the lower grades of Manitoba wheat is used. United States hard winter wheats are well liked and are preferred to Argentine wheats but are generally considered to be worth from 3 to 4 percent less than No. 2 Manitoba wheats. There have been times, however, when hard winter wheats have brought a higher price than No. 2 Manitoba.

Australian wheats, because of their low moisture content have about the same market value as Plate wheats, but owing to their low gluten content cannot be used to any considerable extent in the milling mixture. Red durum and mixed durums from the United States have been used in times past to the extent of 5 to 10 percent in the mill mixture when their price was sufficiently low to make their use profitable and when other wheats available for the mixture were strong enough to offset their weak quality. The Argentine, Danubian, and Russian wheats are considered to be very variable in quality, whereas the Manitobas and hard winters are rather uniform in quality.

One miller reported that when he was required to use 20 percent of domestic wheat his milling mixture consisted of 20 percent domestic wheat, 45 percent Manitoba No. 2, and 35 percent Plate. He further

stated that 35 percent was the maximum quantity of hard winter wheat he could use in his milling mixture, 65 the maximum of Manitoba wheat, 35 the maximum of Argentine wheat, and 10 percent the maximum of red durum. He also stated that he could use some Australian and Karachi (India) wheats and could substitute some Danubian for Argentine wheat.

Another miller stated his mixture varied according to the relative price and availability of the various types of wheat but that usually it ran about as follows in percentage: 10 domestic, 50 Manitoba or (25 Manitoba and 25 hard winter), 30 Argentine, and 10 Danubian wheat.

The preceding mixture applies to the conditions under which millers are not required to use any specified minimum quantity of domestic wheat. At one mill visited each type of wheat used is cleaned, washed, and conditioned separately. Only after the wheats are properly conditioned are they mixed together for milling purposes. The mill mixture used is made up to a standard hectoliter weight of 75.5 kg and the flour extraction from it is held at about 72 percent. The moisture content of domestically milled flours ranges from 14 to 16 percent.

The mill under discussion makes three grades of flour, the specifications of which are given in table 9.

TABLE 9.—*Milling extraction, proportion in total production, and wet gluten, protein, and ash contents of the grades of flour produced at one Belgian mill*

Kind of flour	Milling extraction	Proportion in total production	Wet gluten content	Protein content (basis, 14-percent moisture)	Ash content
	Percent	Percent	Percent	Percent	Percent
Straight	72	80	37.5		0.48
Long patent	65	15	35	12	.45
Short patent	50	5			

The grades of flour shown in table 9 are said to be fairly typical of the grades and qualities of the flours most commonly used in Belgium for bread-making purposes. Some soft wheat flours are used but only in comparatively small quantity and for special purposes such as biscuit making. These latter are usually made from a mixture of domestic and Argentine wheats. Another special flour is made for use in the manufacture of ice-cream cones and wafers. United States hard winter wheat is considered best for making flour for this purpose.

The Straight grade flour referred to above is used for the production of the ordinary cheap breads, the long patent flour for rolls and the better or special breads, and the short patent flours for cakes and pastries. Any low-grade flour produced in connection with the milling of the three grades here mentioned is used for feeding purposes.

Belgian millers are not permitted to bleach or to improve the quality of their flours by the use of chemicals and the importation of bleached flours is prohibited. Because of the prohibition against the use of chemicals in flour, self-rising flours cannot be marketed in Belgium.

BAKERY PRODUCTS AND BAKING PRACTICES

The breads made are principally of wheat flour. Rye breads are said to constitute not more than 5 percent, and whole-wheat breads only about 7 to 8 percent of the total used. In 1933, when this subject was under observation the wheat-flour breads of Belgium were among the best in quality in Europe. They were of medium-light texture with a thin crispy brown-colored crust. The interior was soft but not sticky or doughy. The crumb was of a light creamy color. These breads were of excellent flavor. The common or cheaper breads contained no milk or shortening material for these ingredients were used only in the fancy or special breads. Loaf volumes average about 3,200 cc per kilogram of bread. A dry-matter content of not less than 640 g per kilogram of bread is required by law; loaves when offered for sale must be of a weight equal to not less than 96 percent of their designated weight.

Other forms of bakery goods produced consist of pastries, cakes, and tarts, and a sort of cheap gingerbread type of cake made from rye flour. The pastries are of excellent quality and include both the French and the Danish or Swedish type.

About 90 percent of the wheat-flour breads is hearth-baked and 10 percent pan-baked. Some hearth-baked breads are made in long narrow shapes, but most are made in flat round shapes. The common bread, which constitutes about 70 percent of the total production of wheat-flour bread, is of this latter type. Most of the fancy or special wheat-flour breads are also of the hearth-baked type but some are of the pan type. The common or cheap hearth-baked loaves differ from the fancy hearth-baked loaves in that they are baked more closely together in the oven so that they touch each other.

Bread baking is generally done by the sponge-and-dough method. Bakeries are modernized so that even the smallest bakeries in the cities use kneading machines. Only in the smaller villages does hand kneading still exist.

Practically all the bread used is made in commercial bakeries. Belgian bakeries are reputed to be among the best to be found anywhere in Europe. Most of the baking is done in bakeries of the proprietor-operated small-shop type. There are some large bakeries, but only in the principal cities. These larger bakeries distribute their product to the public mainly through bread shops which they maintain at numerous points in the locality which they wish to cover. Some deliveries are made to the consumer from these shops, but as a general rule most sales and deliveries are made over the shop counter. Bakery products are not sold in grocery stores as in North America.

DIETARY HABITS

Belgium is primarily a wheat-flour bread country. Rye and whole-wheat breads are little used. It is considered hardly reputable to eat whole-wheat bread unless it is labeled health bread. Among the poorer people bread and potatoes are the principal foods.

Breakfast for the middle and lower classes of people usually consists of bread, an egg, and a cup of coffee. For the upper- and some of the middle-class people rolls are used instead of bread, and butter and jam are served. Cereal foods such as wheat farina and oatmeal are sometimes served at breakfast. During the forenoon no lunch is eaten, except by some of the laborers.

Except for laborers who must carry their midday meal, the heavy meal of the day comes at noontime. This meal consists of soup, cooked meat, potatoes, vegetables, and sometimes salads, but no bread. People who carry their dinners have meat or jam sandwiches. From 3 to 5 p. m. is tea time, when cakes and pastries are also served. This is more or less a social period and in the cities the cafes and restaurants are usually full of people.

The evening meal is served from 6 to 8 p. m. For those who carry their midday food this is a heavy meal, but for those who have their heavy meal at noon, it is the beginning of a lunch-and-drink period which lasts most of the evening. This lunch consists of bread and cold meats or sausages and, in some instances, porridge. The beverage served may be tea, beer, or wine.

BRITISH ISLES*

The British Isles are the premier wheat-import market of the world. Wheat importations constitute more than a third of the total world movement in that grain.

The British Isles have an area of 112,543 square miles (about the size of Arizona) and a population of approximately 50,000,000.

Wheat, almost exclusively, is the grain used in the production of the bread consumed. Several centuries ago the principal bread grain used was rye, but now only an insignificant percentage of the total quantity of bread consumed is made from this latter grain.

WHEAT PRODUCTION

Wheat production amounts to less than one-fifth of the domestic requirement for that grain. These islands, however, are well suited for the production of wheat. This fact is reflected in the high yields per acre which average more than double those obtained in the United States. Drought, which is one of the most potent causes of crop failures in most wheat-growing countries, is never responsible for wheat-crop failures in the British Isles. On the contrary, the best yields occur in the drier seasons. Another favorable circumstance which is possibly associated with climatic conditions is the general healthiness of the crop. Disastrous epidemics are outside the experience of the present generation of wheat growers; and although pathologists are aware of the occurrence of disease, the proportion of wheat thus affected is so small that very many growers do not recognize its presence. The most they will admit is that they suffer from "a bit of blight"—a term apparently covering everything from nitrogen starvation to yellow rust. Frost as experienced here causes very little loss.

Although wheat production may be very satisfactory from the standpoint of growth and yield, there are certain other important factors that do not favor its production. The small scale of the operations, which does not permit the use of the most efficient means of harvesting and handling, makes for high production costs. The occurrence of wet weather at harvest time necessitating extra handling or artificial means of drying also often adds considerably to the cost of production and sometimes has a damaging effect on the condition of the grain. Not least of the factors unfavorable to wheat production, is the poor baking quality and comparatively high moisture

* Including England, Wales, Scotland, and all of Ireland.

content of these wheats, which usually cause them to have a lower commercial value on the domestic markets than foreign wheats.

Because of the relative coolness of the summers, the period required for the growing of wheat in the British Isles is much longer than in the majority of wheat countries. Wheat sown in the autumn is usually in the ground 8 months before coming into flower. It may, however, be sown until the middle of February with a reasonable chance of securing a crop. Apart from the fact that the farmers prefer to do as much of their planting as possible during the autumn months, the chief disadvantage against spring sowing is that weather and soil conditions are usually less favorable for seeding, and yields are less satisfactory. As a consequence, the extent of spring sowing is relatively small.

Harvesting begins in August. The use of combine machines for cutting and threshing wheat is only in the experimental stage, and is not likely to be adopted to any great extent, for wheatfields are relatively small and weather conditions generally unfavorable for efficient operation. Only a small percentage of the wheat is threshed at harvest time. Most of it is stacked in the field and threshed during the autumn months. Very little unthreshed grain is stored in barns or sheds. Many of the stacks are provided with a thatched covering made of straw. Usually threshing does not take place until the farmer wants to market his grain.

Wheat production during the pre-war period 1909-13 averaged 59,640,000 bushels per annum (table 10). During the post-war period 1924-28 annual production averaged 53,572,000 bushels and during the 1929-33 period 48,348,000 bushels. It would appear from the latter two averages that production is not only lower than in pre-war times but that its trend is downward. But this trend stopped in 1931 when production reached the low point of 38,594,000 bushels. Since then there has been a definite trend upward, reaching in 1934 to 73,569,000 bushels.

TABLE 10.—Acreage, production, yield per acre, trade, and apparent utilization of wheat in the British Isles, average 1909-13, 1924-28, 1929-33, annual 1929-34

Year	Acreage	Production	Yield per acre	Imports ¹		Exports ¹²	Apparent utilization ³	
				Wheat	Flour ²	Flour ²	Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:								
1909-13.....	1,887	59,640	31.6	192,304	27,110	3,736	278,378	6.1
1924-28.....	1,621	53,572	33.6	205,712	33,018	12,967	270,365	5.8
1929-33.....	1,455	48,348	33.2	216,448	32,687	10,001	287,490	5.8
Annual:								
1929.....	1,414	50,942	36.0	194,365	36,282	10,817	.....	.....
1930.....	1,432	49,350	30.3	212,605	37,301	10,081	.....	.....
1931.....	1,271	38,594	30.4	241,997	25,312	12,294	.....	.....
1932.....	1,304	44,445	32.6	219,905	25,683	10,133	.....	.....
1933.....	1,791	64,407	35.9	213,371	28,939	7,125	.....	.....
1934.....	1,968	73,569	37.5	201,472	22,537	7,690	.....	.....

¹ Year beginning July 1. Reexports have been deducted from imports.

² Flour converted to grain on basis of 4.5 bushels per barrel.

³ No exports of wheat are reported.

⁴ Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

The increases in production that occurred in 1932, 1933, and 1934 were partly due to increased yield per acre on account of exceptional weather conditions and partly to an increase in acreage as the result of the Wheat Act of 1932 guaranteeing to the English farmer a price of 10 shillings per 112 pounds (par value \$1.30 per bushel) for any wheat of millable quality produced up to a total of 50,400,000 bushels. Unless this limitation is raised, it is not expected that wheat production will increase beyond the 1934 level.

Rye production is of little significance, seldom amounting to more than 1,000,000 bushels a year (table 11).

TABLE 11.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in the British Isles, average 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production ¹	Yield per acre	Imports ²	Exports ²	Apparent utilization ³	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1924-28	57	1,233	21.6	915	108	2,070	0.04
1929-33	38	806	21.2	520	15	1,311	.03
Annual:							
1929	42	940	22.4	315	25		
1930	51	1,075	21.1	345	13		
1931	40	811	20.3	377	12		
1932	31	626	20.2	180	9		
1933	26	577	22.2	1,382	14		
1934	24	510	21.3				

¹ Production for Scotland reported for 1925 and 1930 only; other years estimated. Northern Ireland also estimated.

² Calendar years; flour included converted to grain on basis of 6 bushels per barrel, United Kingdom only.

³ Stocks at beginning and end of periods are disregarded.

⁴ Preliminary estimate.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

IMPORTS AND EXPORTS OF WHEAT AND RYE

During the 5-year period 1929-33 annual imports of wheat averaged 216,449,000 bushels and of wheat flour (in terms of wheat) 32,697,000 bushels. Compared with similar data for the pre-war period 1909-13 these imports represent increases of 12.5 and 20.6 percent, respectively.

Although no material change in flour imports is indicated by comparison of the annual averages for the 1924-28 and 1929-33 periods, beginning in 1932 there was a decided drop in flour imports. Because of the placing in that year of a duty on imports of non-Empire flour and because British millers are now prepared to mill Canadian and Australian wheat in order to meet the competition of Canadian and Australian flour, this drop is likely to continue.

Exports of wheat have generally consisted only of re-exports of foreign wheat, and, therefore, are of no significance. On the other hand, the flour exports, although milled from foreign wheat, are significant, for this flour is a product of British mills. During the 1909-13 period, exports of flour in terms of wheat averaged 3,736,000 bushels yearly. During the 1924-28 period, the yearly average was nearly 13,000,000 bushels, or more than three times as great as in the pre-war period, but in the succeeding 5-year period (1929-33) exports of flour showed some tendency to decrease, especially beginning with the 1932 crop year.

Data on rye imports and exports are not available for the pre-war period but data for the post-war period show that the foreign trade of the British Isles in this grain amounts to very little. Imports during the 1924-28 period averaged only 945,000 bushels yearly and during the 1929-33 period 520,000 bushels. Rye exports have been much less than imports, amounting to only a few thousand bushels.

CHARACTERISTICS AND QUALITY OF BRITISH WHEATS

The wheats produced in the British Isles, as a general rule, are very soft in texture and very weak in quality. The gluten in these wheats is not only low in content but is of poor quality—wholly unsuited for bread-making purposes but excellent for biscuit making of the sweet-cake and sweet-cracker types.

Common wheats of both spring and winter habits are grown. Club wheats are produced but not to any considerable extent. No durum wheats are produced. Red and white common wheats of winter habit and red common wheats of spring habit predominate.

Owing to the wetness of the climate, the moisture content of domestic wheats averages from 16 to 20 percent. Because of this and the further fact that these wheats are of very soft texture, usually an appreciable portion of the crop is damaged from sprouting, fermenting, or the development of molds to such an extent that it is unfit for milling.

Except in the production of special biscuit flours, British millers do not use much domestic wheat for milling purposes. A large proportion of the domestic crop is utilized for feed, particularly for poultry, for which purpose it is preferred to foreign wheat on account of its softness.

For a number of years British agricultural experiment stations have endeavored to improve the domestic wheats. Their chief aim has been to develop varieties in which stiffness of straw and high yielding properties are combined with good baking quality. Some progress has been made in this direction, but the quality of the best English wheat, thus far produced still falls short of the standards desired. Some improvement in quality has been accomplished through the elimination of questionable varieties and the distribution of better varieties.

Among the varieties that have been recommended for autumn sowing are *Wilhelmina*, *Yoeman*, *Little Joss*, *Iron III*, *Weibull Standard*, *Rivett*, and *Squarehead Master*. The recommended varieties for spring sowing include *Little Joss*, *A-1*, *April Bearded*, and *Red Marvel* (*Gaphet*). All the varieties mentioned are red in color except *Wilhelmina*, which is white. From the standpoint of acreage planted, it is reported from official sources that *Squarehead Master* is the most important variety. It accounts for about one-fifth of the total. *Little Joss* and *Victor* are the next highest in acreage planted. *Yoeman* is outstandingly the best in baking quality and about the only one that is at all suitable for bread making. Of the spring wheats produced, *Red Marvel* accounts for most of the acreage.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

From the repeal of the Corn Laws in 1846 until 1932 the British Isles were on a free-trade basis as regards grain. Furthermore, during

that period neither direct nor indirect subventions were granted for the purpose of strengthening the competitive position of British farmers in the home market. In 1932 two very important regulatory measures became effective—the Wheat Act and the Ottawa agreements.

The Wheat Act which became a law on May 12, 1932, guaranteed to producers a minimum price of 10 shillings per 112 pounds (about \$1.30 per bushel at par) and imposed upon millers and importers of flour the obligation of making "quota payments" into a special fund for maintaining the price guaranty. The guaranteed minimum price began with the 1932 crop, applied only to millable wheat, and was limited to 50,400,000 bushels. On June 17 an order became effective requiring every miller and exporter of flour to make to the commission set up to administer the Wheat Act a quota payment of 2s. 3d. per sack of 280 pounds of his output of flour. The amount of this payment has been changed several times since, but only slightly.

Under the terms of the Ottawa agreements which became effective in November 1932, a duty of 2s. per quarter of 480 pounds (about 6 cents per bushel) was imposed by the United Kingdom on imported non-Empire wheat and a 10-percent ad valorem duty on non-Empire flour. Another feature of these agreements which was harmful to United States interests was the stipulation that imports of Empire wheat, in order to be eligible for free entry into the United Kingdom, must be accompanied by a certificate of origin and a through bill of lading from the country of production in support thereof. This requirement was practically a death blow to the practice of storing Canadian wheat at United States Lake ports and sea ports for later transshipment to the United Kingdom.

As concerns the Irish Free State, legislation was enacted July 6, 1932, to encourage the expansion of the domestic milling industry to a point sufficient to take care of domestic needs. One form of encouragement given was the placing of a duty of 5s. per sack of 280 pounds on imports of flour. The Agricultural Produce (Cereals) Act of 1933, which followed, abolished this duty but prohibited the import of flour except by license. Another governmental regulation affecting the milling industry is the compulsory use of a certain percentage of domestic wheat. The normal annual consumption of flour in the Irish Free State amounts to 4,250,000 barrels. In 1933 (1)⁷ flour imports amounted to approximately 800,000 barrels. In 1934 flour imports fell to less than 500,000 barrels. This reduction in imports has been made possible by the governmental protection and assistance given to the domestic milling industry. In the course of another year or so, it is expected that the milling capacity of the Irish Free State will be able to produce the full domestic requirement of flour.

MILLING AND WHEAT-MIXING PRACTICES

The milling industry of the British Isles is largely concentrated in a few milling concerns. According to Hurst (6), the largest of these concerns is the Cooperative Wholesale Society, which at that time (1930) was milling approximately 22½ percent of all grain, imported and home-grown, for the British market. The next largest millers are Joseph Rank, Ltd., and Spillers, Ltd., each of which accounted for

⁷ Italic numbers in parentheses refer to *Literatura Cited*, p. 170.

approximately 20 percent of the total milling activity. Fourth in importance is the Associated London Flour Millers, Ltd., which accounted for 5 percent of the total. The remaining 32½ percent is made up by small mills scattered throughout the country.

At the time this information was published, it was expected that an 80-percent concentration of the milling industry in the hands of the four operators mentioned in the preceding paragraph would be realized at some future date. Subsequent developments in the industry have brought this prediction nearly to realization. Some of the large concerns mentioned have increased their capacity either by the purchase of other existing plants or by the erection of new plants.

Because the British Isles constitute the world's greatest importer of wheat, this concentration of so much British flour milling into the hands of a few concerns is an important factor in the world wheat-demand situation. The wheat requirements and the purchasing power of these few concerns constitute such a large portion of the total foreign trade in wheat as to give them a considerable bargaining advantage over exporters who are dependent upon the British market for the disposal of their stocks of wheat. This is particularly true in times of heavy export supplies.

Besides the concentration development that has taken place in the British milling industry in recent years, another development of great importance has been the rationalization of the industry. Messenger (9) reported that as far back as 1913 a movement was started by the leaders of the industry to come to an agreement whereby some of the ruinous competition practices would be checked and the industry placed on a paying basis. But not until September 1929 did this movement succeed. James V. Rank is credited with being the father of the rationalization scheme finally adopted. This scheme, under the control of what is known as the Millers' Mutual Association, has the avowed purpose of reducing costs of flour manufacture and distribution by improved organization of the industry. At its inception this association accounted for 90 percent of the total milling capacity of the country, excluding that of the Cooperative Wholesale Society which did not become a member.

One method employed under this scheme to reduce costs has been the purchase and closing up of superfluous mills. The money required for this purpose was obtained through assessments levied on the individual members of the association. The elimination of these mills permitted the remaining mills to operate on a fuller time basis and consequently on a cheaper unit cost-of-production basis. It is claimed that no attempt was made to fix flour prices, but the overlapping of sales territories and other uneconomic trade practices were eliminated which in effect reduced price competition. One of the agreements entered into was that member mills would not buy any foreign flour. This no doubt has tended to reduce the importation of high-strength flours, because in former years some of the mills followed the practice of buying such flours for blending with their own product.

The writer knows of no agreements under the rationalization scheme regarding the purchase of foreign wheat, but it may be that the operation of the scheme engendered a spirit of cooperation in that direction which probably has tended to lessen competition among members in the purchase of wheat supplies.

It can be definitely said that since the rationalization scheme has been put into effect the British milling industry has been on a sounder financial basis than it was previously. This is evidenced by the published annual financial statements of the milling companies and by increased dividends paid to stockholders in recent years.

The commercial mills, almost without exception, are of the modern roller-system type and the great bulk of the milling is done in mills of 1,000 or more barrels of flour capacity per 24 hours. Because the mills of the United Kingdom and Irish Free State are so largely dependent upon foreign wheat for their supplies for milling purposes, practically all the mills of any commercial importance are located at some port or on some waterway connected with a port. The principal milling centers in the United Kingdom, in the order of their importance, are Liverpool (including nearby Mersey-side towns), London, Hull, Cardiff, Edinburgh, Glasgow, Bristol, Newcastle, and Belfast. Until the last few years Manchester was also an important milling center. In the Irish Free State, Dublin, Cork, and Limerick are the chief milling centers.

Most British mills employ up-to-date equipment and methods of operation. Some of the mills are rather new and most of the others are in good repair. The total grinding capacity of British mills is more than sufficient for domestic requirements.

The grain-storage accommodations at British mills are generally limited, in some instances sufficient only for a few days' supply of grain. Other stocks of grain are carried by these mills in port elevators and warehouses and in barges. These stocks, usually much larger than the mill stocks, move to the mill usually only as needed.

When the different kinds of wheat arrive at the mill they are generally binned separately, except that wheats that require similar conditioning treatment are sometimes mixed together in the proportions in which they will be used in the milling mixture, and then are binned.

In the preparation of wheat for grinding, the British miller usually employs a considerably more elaborate system than does the United States miller. All wheats before binning are given a rough cleaning. In the case of the drier types of wheats, frequently a small quantity of water is added before these are binned. Prior to milling, the various wheats that are to be included in the milling mixture are given a thorough cleaning by means of washers, stoners, scourers, screening machines, and aspirators, and cockle, oat, and spiral separators. The washing of the wheat is one of the last steps in the cleaning process and usually the first in the conditioning and tempering process. This latter process may include drying, heating, further dampening, and storing. One of the important functions of conditioning and tempering is to control the moisture content of the wheat at the time of grinding. In British mills wheat usually goes to first break rolls with a moisture content between 16 and 17 percent, but in some instances it may be as high as 18 percent. The flour produced from these mills usually contains between 15 and 16 percent moisture.

It is the general practice to grind the various wheats that are used in the production of a British commercial flour together rather than separately but the mixing usually takes place in piecemeal fashion. Wheats of dissimilar texture and moisture content are washed and conditioned separately, which means that the mixing of all the

wheats used is frequently not completed until just before they are ground.

The outstanding differences between the British and United States methods of milling are as follows: British millers use a much greater amount of grinding surface. The amount used is reported by one authority as being about 100 inches of linear surface per sack (280 pounds) of flour grinding capacity per hour, which is equivalent to 2.92 inches per barrel of flour grinding capacity per 24 hours. The rolls in the roller mills are placed on a diagonal rather than a horizontal plane, are much heavier and longer than United States rolls, and they revolve at slower speeds than United States rolls. The break rolls usually are 5 feet in length and 10 inches in diameter. Sifters are not used so extensively as in the United States; their use is confined almost exclusively to break stocks. Centrifugal reels are used on reduction stocks. British millers use a more extensive system of middlings purification than do United States millers.

British mills produce four general classes of flour: bread flour, pastry and cake flour, biscuit flour, and household flour, the latter either plain or of the self-rising kind. The bread flour is produced from a mixture of foreign wheats of medium to strong gluten quality. Biscuit flour is produced almost wholly from English wheats. Household and cake flours are produced generally from soft wheats, either foreign or domestic. A considerable proportion of the household flour produced is of the self-rising kind. The following are names used in designating the various milling grades of flour produced: Short Patent, Long Patent, Baker's, Low Grade, and Straight. No "Red Dog" grade of flour is produced. British flour extractions average about 71 percent. It is the general practice among British millers to bleach their flour.

Routine chemical tests do not play so important a role in the operation of British as of United States mills. Protein content is not considered a reliable index to quality; more reliance is placed on gluten tests. Ash-content determinations are made for the millers' guidance in making flour separations, but are of little importance in connection with the sale of flour to the baker.

British millers buy their wheat principally in London, the Baltic Exchange⁸ being the center of the cargo and large parcel trade and the Mark Lane Exchange,⁹ the center of the small trade in parcels from 1,000 to 5,000 quarters (8,000 to 40,000 bushels) each. Millers in

⁸ This organization is said to have grown out of a city coffee house at which, from about 1744, London merchants engaged in Russian trade were accustomed to meet one another and discuss such commodities as tallow and hemp to be imported in those days from the Baltic ports of Russia. The field of operations of the Baltic merchants was gradually widened, but not until 1849 did this exchange begin to interest itself to any extent in the over-sea grain trade. In 1901 the erection was begun of the Exchange's present home in St. Mary Axe, London, E.C. 3. This building was opened in 1903 under the title of "The Baltic Mercantile Shipping Exchange." "This exchange is the greatest shipping exchange in the world. It is essentially a cargo market. It is not a public exchange and only actual members may make use of it. The membership is large, and includes shipowners and brokers, merchants, manufacturers, millers, exporters, importers, oil-seed brokers, timber merchants, wharfingers, and representatives of many other trades. The activities of its members include the handling of cereals, oilseed products, timber, and a number of other commodities; also maritime insurance and shipping. A wheat option market also operates on this exchange. Business is transacted between the hours of 11 a.m. and 7 p.m."

⁹ This is a trade organization with a showroom located on Mark Lane, London, E.C. 3, in which samples of grain and feed are displayed for sale. This institution dates as far back as 1717. The privileges of displaying are granted only to members, many of whom are also members of The Baltic. Sales may be made to anybody, but are limited to grain or feed actually in the possession of, or under the control of, the seller. Grain transactions on this market are confined to parcels consisting of 1,000 to 5,000 quarters (8,000 to 40,000 bushels). Business is transacted on this market only on Mondays, Wednesdays, and Fridays. Formerly most of the grain importations received at London were marketed here, but in recent years, with the development of larger milling units and business, it has become the practice for the larger mills to purchase their supplies in cargo or large parcel lots direct from the exporter. Today a major proportion of the wheat used in England is purchased in this way.

other parts of the British Isles either maintain offices in London or are represented there.

Liverpool is preeminent in grain futures markets and is also an important cargo market. Purchases of foreign grain in the British Isles, and to a considerable extent in many continental European countries, are made on London Corn Trade Association ¹⁰ contract forms.

The British miller in his endeavor to produce flour of a quality suitable for the trade he serves undoubtedly is just as particular as the miller in other countries, but the larger number of different kinds and qualities of wheats usually available for his use makes it possible for him to produce flour of the desired quality from a number of different combinations of wheat. Therefore he is likely to give more consideration to price. Owing to the necessity for using foreign wheats almost to the full extent of his milling requirements, the British miller, through circumstances over which he has little or no control, is frequently compelled to change his mixture. This has given him valuable experience and a knowledge of the milling and baking characteristics of many foreign wheats, so that he has become most skillful in the blending of wheats to produce flour of the desired quality. Thus, he is enabled to take advantage of price differences between the various foreign wheats to which millers in other countries dare not give consideration.

Quality requirements differ somewhat between the various sections of the British Isles. In the production of bread flour in England and Wales, United States hard winter wheats come nearest to fulfilling the qualifications desired, and until the last few years a very considerable quantity of these wheats were used by the millers of this area. These wheats were seldom if ever used alone, but were employed as "fillers"¹¹ in the milling mixture. Other filler wheats which are used are Argentine and medium-strength Russian wheats. Besides the one or two filler wheats contained in an English miller's mixture, there are also some strong and some weak wheats. Strong wheats include Canadian Manitobas, and the better quality of hard wheats of the Union of Soviet Socialist Republics and the United States. Weak wheats include English, western and central European, Danubian, Indian, and Australian wheats. Durum wheat is sometimes also included in mill mixtures as a weak wheat, but never in any appreciable percentage. The weak wheats are selected because of their relatively lower price and because of certain properties other than gluten strength, such as flour yield, color, and high gassing power. The strong wheats are

¹⁰ This association was formed in 1878 by a group of London grain merchants and was incorporated on April 17, 1886, under the Companies' Act (1862-83). The objects of the association at the present day are perhaps a little wider in scope than at the time of incorporation, but the basic aim remains the same; namely, to "promote, establish, and secure to the grain trade uniformity in commercial transactions and usages founded upon just and equitable principles." Its membership is open to any grain firm or merchant of established commercial integrity, and numbers 500 of the leading grain firms of the world, the domicile of one-third of which is outside the United Kingdom. The annual subscription is 5 guineas (£25.50 at par) and an entrance fee of like amount is payable on election. The association is located at 28, St. Mary Axe, London, E.C. 3, and is governed by an elected body of 24 of its members called the executive committee. The specific functions of the association are to (1) initiate suitable and equitable forms of contract for grain transactions between the grain merchants of the United Kingdom and other countries, and between continental European grain merchants and grain merchants located in other parts of the world; (2) provide for the settlement by arbitration of any disputes between buyer and seller arising from the terms of the contract and to act as a court of appeal; (3) act as a depository for samples of grain on which certain transactions are based; (4) establish, from samples representing the deliveries at time of discharge, the fair average quality standard on which basis grain from certain countries is sold; (5) formulate the rules for the sampling of grain at the port of discharge; and (6) make natural weight of grain determinations and other tests when necessary under the terms of the contract.

¹¹ A "filler" is a wheat that neither helps to carry a weak wheat nor itself requires support from the strong components in the mixture.

selected to offset any strength deficiencies in the other wheats in the mixture.

In Scotland stronger wheats are demanded for bread flours than in England. The wheats used in the production of these flours must consist of practically all Canadian or strong United States wheats. In the case of cake- and pastry-flour production in Scotland, soft red winter wheats from the United States were formerly used, but in recent years Australian and continental European wheats have taken their place.

In Ireland the quality of flour required for the production of commercial breads is somewhat the same as in Scotland. In rural districts and villages of Ireland much of the bread is made in the homes. For this purpose a soft weak flour made from white wheat is required. Formerly white wheats of the softer types from our Pacific coast were preferred, but in recent years they have been largely replaced by Australian white wheats. One of the chief reasons that white wheats are preferred to soft red wheats is that Irish feeders are willing to pay a higher price for the offals from the white wheats.

The duty of 2s. per quarter of 480 pounds (approximately 6 cents per bushel at par) placed on imports of non-British wheat into the United Kingdom in November 1932 has increased the use of Canadian and Australian wheats, but has not eliminated foreign wheats from the United Kingdom market, nor is it likely that it ever will, at least not until world production and world stocks are more nearly consistent with world needs. The oversupply of wheat in the world during the last few years has forced certain non-British surplus-producing countries to proffer their wheats on the United Kingdom market at prices under their ordinary relative market value in comparison with Canadian and Australian wheats so that a market might be found for them. Should the world supplies of wheat be reduced in future years to a point in harmony with or below world requirements, then the importation of non-British wheats into the United Kingdom might possibly decline to practically zero because then these wheats would find a ready market elsewhere at prices that would not have to offset any duty discrimination.

Canadian wheat is available at all seasons and is present in nearly all British bread-wheat milling mixtures. Most other wheats are available only at certain seasons of the year and some years may not be available at all. Fortunately, certain of these wheats are interchangeable. This, together with the fact that the season of availability varies for the different wheats, not only enables the British miller to vary the composition of his milling mixture to take advantage of price fluctuations without changing the quality of his flour, but also necessitates certain changes at different seasons of the year. The usual months of the year when the various wheats first become available on British markets are as follows:

February to March—Argentine and Australian.

June—Iranian.

July—Indian.

August—United States soft winter.

September—United States hard winter and Pacific coast white wheats, Danubian, Balkan, Russian, and English.

October—Canadian hard red spring.

The data in table 12 gives the approximate proportions of wheats of different origins in British milling mixtures during the 3 years 1928, 1929, and 1930. These proportions are based on the total quantities of the various wheats used throughout the year and do not represent actual milling mixtures.

TABLE 12.— *Approximate proportion of foreign wheat milled in British mills, 1928-30*

Type of wheat	1928	1929	1930	Type of wheat	1928	1929	1930
	Percent	Percent	Percent		Percent	Percent	Percent
Canadian	38.5	29.8	22.7	United States	11.8	9.3	18.2
Australian	8.5	10.1	11.0	Argentine	20.1	36.0	13.2
Indian	1.3	.1	2.9	Other wheats	2.2	3.2	6.5
English	11.6	11.5	9.1				
Russian			16.1		100.0	100.0	100.0

Source: National Joint Industrial Council for the Flour Milling Industry. Tech. Ed. Series, Pamphlet 9 (4).

BAKING PRACTICES

Except in rural Ireland and in certain sections of northern England, nearly all of the bread consumed is baked in commercial shops and bread bakeries. Only in the excepted districts is home baking practiced to any considerable extent. Commercial baking is a highly developed industry and although bakeries of the factory type are found in all the cities, bakeries of the shop type are still numerous. It is reported that just prior to the World War these smaller bakeries were going out of business in the face of competition from large factory bakeries, but this trend was arrested during the war and has since been in abeyance mainly through the action of local associations of bakers.

The technique of baking employed in the factory bakeries is very modern. Usually a chemist is employed who is competent to test and mix the various flours before they are used and to prescribe the proper procedure in baking to produce the desired results. The equipment is similar to that used in United States bakeries except for the mixers which are of the slow-speed, bowl type.

In some sections millers operate bakeries in order to provide a regular outlet for the products of their mills. Similarly, the Cooperative Wholesale Milling Society, which mills nearly one-fourth of the flour used in the British Isles, maintains a working relationship with retail cooperative societies that operate bakeries whereby these bakeries may take all or a certain proportion of their flour requirements from the society.

In considering the British baking industry, mention should be made of that branch of it concerned with the manufacture of biscuits, by which is meant small sweet cakes and sweet crackers. Crackers of the soda and saltine types are not produced. The consumption of these biscuits has grown to great importance, chiefly in connection with the afternoon tea-drinking habit. The production of biscuits in the United Kingdom amounted to 377,440,000 pounds in 1930, which represents an increase of from 24 to 27 percent over the 1924 production. Spacious factories for the manufacture of biscuits are located in London, Reading, Birmingham, Manchester, Liverpool, Carlisle, Glasgow, Edinburgh, Dublin, and other cities. These factories use up-to-date methods and equipment, in that respect being as fine as can be found anywhere in the world.

In the production of the common commercial bread, the baking formula generally used, on the basis of a 280-pound sack of flour, is as follows: About 140 pounds of water, $2\frac{1}{2}$ pounds of yeast, $3\frac{1}{2}$ pounds of salt, and 1 pound of malt extract or malt, sometimes together with some other form of bread improver. A sack (280 pounds) of flour is expected to yield, on the average, 384 pounds of bread, but yields of 400 pounds are not uncommon. Sugar, lard, and milk are used only in the production of certain special or fancy breads.

Formerly the long-process method of baking, involving the preparation of a sponge and dough, was used everywhere throughout the British Isles. It still persists in some parts, especially in Scotland, but elsewhere during recent years it has been superseded by the shorter straight-dough method.

In England and Wales bread is chiefly pan-baked (called "tinned loaves"). Formerly most of the bread was hearth-baked. In Scot-



FIGURE 17.—Types of wheat bread found in London.

land much of the bread is baked on the overdraw plate in close formation so that in baking no side crust will be produced except on the border loaves.

The most usual size is the 2-pound loaf. In the case of English bread this loaf has an average volume of approximately 2,500 cc; it is about the size of a United States 1-pound loaf. The Scottish 2-pound loaf is appreciably larger than the English loaf. (See fig. 17 for common styles of bread produced in London.)

English bread has a very close-grained and compact interior, a tough crust, and a moist crumb. Scottish bread is lighter in texture, is slightly less moist, and its crust is not so tough. Irish commercial breads are similar to Scottish breads in quality characteristics. The home-baked breads in Ireland, which account for 50 percent or more of total bread production, are of the soda-biscuit type so popular in the Southern States of the United States. To make this bread, the

Irish housewife mixes her flour with buttermilk and a pinch of bicarbonate of soda. The dough or batter thus made is put into a three-legged, round, wrought-iron pot, about 12 inches in diameter. A lid is placed on the pot, which is then set among the turf briquets in a turf oven for baking from 30 to 40 minutes. The Irish housewife is very particular about the quality of her bread. A white, tender, or soft crumb is desired.

The practice of wrapping bread before sale has not yet become nearly so prevalent as in the United States but is increasing. Some attempts have been made to sell sliced bread, but thus far this type of loaf has not taken well with the British consumers.

In the distribution of his bread, the small-shop baker deals direct with the consumer, who either makes his purchase at the shop or at home from the roundsman (baker's salesman), who calls at his door. The large factory baker either sells his bread in wholesale quantities to retailers or maintains confectionery shops, cafes, and similar retail establishments for the sale of bread, cakes, and confectionery.

DIETARY HABITS

In general, the diet for the lower classes of people of the British Isles is plain but substantial, consisting mainly of tea, bread, fish, potatoes, and cabbage. For the upper classes it is varied.

As Great Britain has long held to the policy of duty-free food, its food markets display a great variety from all over the world. Moreover, because of the cheapness of the water transportation by which foreign products are brought to the British Isles, the prices are not much higher than in the country where these foods are produced.

People of the upper-middle class and the nobility usually start their day with a cup of tea. After they arise and are ready for the day, they sit down to a substantial breakfast, consisting of more tea, rolls with butter and orange marmalade, fruit or porridge, and kippered herring or bacon and eggs. At noon they have a meal of bread, roast meat (or fried or broiled chops), boiled potatoes with peas, beans, or cabbage, a custard or sweet of some sort, and coffee. At 4 p. m., almost without exception, tea and sweet cakes are served, and sometimes sandwiches. An evening meal is served between 7 and 8 o'clock. It ordinarily consists of coffee, bread, fish and potato chips, and fruit, or cheese and crackers. On more formal occasions this meal consists of coffee, bread, soup, fish and potatoes, roast meat, peas or cabbage, cheese and crackers, or a sweet.

The evening meal of the poorer classes is usually served an hour or two earlier than is customary among the upper classes, and usually consists of tea, sandwiches, and sweet cakes.

DENMARK

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Both wheat and rye are important items of consumption in Denmark. Formerly, rye was the more important, but in recent years wheat has dominated. During the pre-war period, 1909-13, the annual per-capita consumption of rye averaged 9.0 bushels and wheat 4.7 bushels (tables 13 and 14). Twenty years later (1929-33) the average annual per-capita consumption of rye had moved down

to 5.6 bushels, whereas that of wheat had moved up to 6.4 bushels. Each of these grains is of considerable consumptive importance, both as human food and as animal feed.

TABLE 13.—*Average, production, yield per acre, trade, and apparent utilization of wheat in Denmark, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Area ¹	Pro- duc- tion	Yield per acre	Imports ²		Exports ³		Apparent utilization ⁴	
				Wheat		Wheat		Total	Per capita
				Wheat	Flour ⁵	Wheat	Flour ⁵		
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:									
1909-13	154	6,322	41.1	47,153		4,937		12,880	4.7
1924-28	225	9,260	40.9	7,075	2,864	421	201	18,518	5.4
1929-33	255	10,916	42.8	9,665	2,635	74	46	23,036	6.4
Annual:									
1929	293	11,772	40.3	4,769	3,281	237	73		
1930	219	10,216	41.0	7,886	3,654	76	51		
1931	259	10,653	38.8	11,332	3,060	18	39		
1932	215	10,937	44.9	10,317	1,731	24	38		
1933	241	11,543	44.2	10,389	1,145	11	25		
1934	282	12,494	41.3	18,319	1,124	51	41		

¹ Year beginning July 1, except 1909-13, which begin Aug. 1.

² Converted to grain on basis of 1.5 bushels of grain per barrel of flour.

³ Stocks at the beginning and end of periods are disregarded.

⁴ Includes flour in terms of grain.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 14.—*Average, production, yield per acre, trade, and apparent utilization, of rye in Denmark, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Area ¹	Pro- duc- tion	Yield per acre	Imports ²	Exports ³	Apparent utilization ⁴	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	175	11,122	25.8	8,724		288	9.0
1924-28	175	11,711	21.1	7,356	112	18,255	5.3
1929-33	345	9,435	27.1	10,831	313	19,983	5.6
Annual:							
1929	389	10,431	27.1	10,765	391		
1930	579	11,025	27.2	13,368	423		
1931	532	8,166	27.3	8,280	319		
1932	267	8,734	30.1	10,684	312		
1933	354	9,809	28.0	11,006	269		
1934	375	11,023	29.1	7,170	307		

¹ Year beginning July 1, except 1909-13, which begin Aug. 1, flour included, converted on the basis of 6 bushels of grain per barrel of flour.

² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Denmark is a country of 17,144 square miles in area (inclusive of the Faeroe Islands), about the size of the combined areas of Massachusetts and New Hampshire, and has a population of approximately 4,000,000 people. At present, about 23,000,000 bushels of wheat and 20,000,000 bushels of rye are required annually to fill its total needs. Domestic production is sufficient to supply only about one-half of these requirements; the other half must be imported.

IMPORTS AND EXPORTS OF WHEAT AND RYE

Annual imports of wheat, including flour, averaged 7,155,000 bushels during the 1909-13 period, and 12,240,000 bushels during the 1929-33 period. Annual imports of rye during these two periods were 8,753,000 and 10,831,000 bushels, respectively. Wheat imports in the 1929-33 period represent an increase of 71 percent over those in the 1909-13 period and rye imports an increase of 24 percent.

Some wheat and rye are exported each year, but their combined total is less than 1,000,000 bushels. Since the World War, wheat exports have tended to decrease, whereas rye exports have tended to increase.

The average annual production of wheat in the pre-war period, 1909-13, amounted to 6,322,000 bushels and that of rye to 16,422,000 bushels. In the period 1929-33, average annual production of wheat had risen to 10,916,000 bushels, whereas rye had fallen to 9,495,000 bushels. In other words, wheat production had increased 73 percent and rye production had decreased 42 percent. Considered from the standpoint of total wheat and rye production, these changes represent a decrease of 10 percent.

CHARACTERISTICS AND QUALITY OF DANISH WHEATS

Most Danish wheats are of very soft texture. Some wheats of the hard type are grown but they lack the qualities generally associated with such wheats when grown in other countries. Practically all of the wheats produced are of winter habit and most are of red color. Largely because the farmers do not employ a uniform system of crop rotation, there is a rather wide variation in protein content of domestic wheats; the range in this factor is said to be from 6.5 to 13 percent (basis 13.5 percent moisture). Moisture content of these wheats is generally high and the baking quality very poor.

Because of their poor baking quality, these wheats are used chiefly for livestock feed. Denmark can use for feed all the wheat it produces; in fact, when there is a good market for pork the crop is insufficient for feeding requirements. Only a small portion of the crop is milled. Available data indicated that 11 percent of the 1930 crop and 4 percent of the 1931 crop were used for milling purposes.

Considerable experimental work has been done to determine the effect on the baking quality of wheat from various kinds of fertilizers applied at different stages in the growth of the plant. This was done in anticipation that possibly it might be necessary at some future time to require millers to use more of the domestic wheats. Experiments have been conducted also to determine whether the quality deficiencies of Danish wheat can be corrected by the addition of some chemical to the flour or by the application of some treatment thereto. These latter experiments have indicated that certain quality deficiencies can be corrected if the wheats are of high-protein content, but not if they are of low-protein content. On the other hand, the fertilizer experiments have demonstrated that the protein content of domestic wheats can be raised to a relatively high point. Consequently, in case economic conditions make it necessary for the Government to adopt regulations requiring the mills to mill a higher proportion of domestic wheat, it is probable that some action will also be taken requiring farmers to fertilize their wheatland in such way as to insure the production of high-protein-content wheat.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES.

The majority of the Danish people are against the principle of taxing foodstuffs, but during the recent economic depression it has been necessary to give wheat farmers some form of relief. The question of how to give relief to wheat farmers was complicated by the fact that the pig industry would be injured if this relief meant an increase in the price of domestic wheat.

There are approximately 4,000 farms in Denmark of 200 to 300 acres in size which might be classed as large farms, 80,000 medium-sized farms, and 120,000 small farms. Wheat and rye are produced chiefly on the large farms, whereas pig raising is done chiefly on the small farms, but the number of farmers engaged in raising pigs greatly exceed the number engaged in wheat production. The pig producers want cheap feeds and have used a considerable proportion of the domestic crop of wheat in years past for feed. Consequently, they were opposed to any form of relief that would increase the price of domestic wheat. Pig producers are willing to use domestic wheats, but only at prices that will insure them a profit.

Owing to the poor baking quality of domestic wheat, Danish millers do not want it. If they did use it to the extent of 100 percent of their milling requirements, the quantity of flour obtained would considerably exceed that normally milled in Denmark from all wheat. Furthermore, if the millers were required to use a considerable percentage of domestic wheat in their milling mixture, the quality of the resulting flour would be so low that consumption would be considerably reduced. Such an effect would please neither the miller nor the producer and certainly would be very unsatisfactory to the consumer. In table 15 data are presented showing relation of wheat production.

TABLE 15.—Domestic production and utilization of wheat and quantity of wheat milled by Danish mills, 1930 and 1931

Item	1930	1931
	<i>Bushels</i>	<i>Bushels</i>
Domestic production	16,213,647	16,652,956
Utilization for flour:		
Foreign wheat milled	1,426,223	7,186,850
Imported flour (in terms of wheat)	3,186,912	3,312,629
Domestic wheat milled	1,087,603	607,477
Total	5,699,768	8,917,957
Excess of domestic production over utilization for flour	1,219,879	1,155,999

¹ Varies slightly from production given for 1930 in table 14 due to difference in source.

² Factor used for converting flour into grain equivalent not given.

Compiled from *Tolymand-Blaet*, published by Centralforeningen af Tolymandshereinger, Copenhagen, Denmark.

Exporting domestic wheat as a possible means of giving relief to the producer is impracticable. It would involve the payment of an export bounty or subsidy of some kind and it would mean that other grains would have to be imported for the use of pig feeders. It would be far simpler to pay the bounty direct to the farmer and let him sell his wheat to the pig producer at its market value for feed.

At first the only relief given by the Government to the wheat grower was of an indirect nature, which resulted in some increased utilization of wheat for milling. Restrictions were imposed on wheat

and flour imports through foreign-exchange regulations. According to the scheme operating in June 1933, a license had to be obtained from the Government before wheat or flour could be imported. This license represented an apportionment or allotment of foreign exchange that could be used for specific import purposes. Through the workings of this scheme, it was possible not only to restrict importations but to favor the import of wheat over flour and to give preference to certain countries. This system continued until December 13, 1933, when an import-tariff system was adopted, the avowed purpose of which was to permit the raising of domestic-grain prices. The tariffs applied to wheat, rye, barley, oats, maize, and wheat flour. Since December 1933 some changes have been made in the tariff rates, but there has been no discontinuance of import tariffs.

MILLING PRACTICES

All of the important commercial mills are located in seaport cities. There is no concentration of the milling industry at any one port. In fact, at none of the ports is the milling capacity sufficient for accommodating full cargo transactions in wheat, so that cargo shipments are usually divided with other ports. Most transactions are in parcel lots. The largest milling concern operates four mills; they are believed to be the only mills in Europe operating on the system used in the United States and with milling equipment imported from this country.

Two general types of wheat flour are made by Danish mills—one primarily for bread and the other for pastry and household use. The bread flours are made from a fairly strong mixture of wheats and the pastry and household flours from a mixture of soft and semihard wheats. According to one informed person interviewed, a suitable mixture for the bread flour would consist of 20 percent Danish, 20 percent Argentine Plate, and 60 percent Canadian Manitoba of Nos. 1, 2, and 3 grade, whereas a suitable mixture for the pastry flour would consist of soft wheats and some Plate wheats. One miller stated he had used no Danish wheats during the last 2 years. At the time he was interviewed he was making his bread flour from a wheat mixture consisting of 60 percent Manitoba and 40 percent Plate. He liked his mixture to consist of three wheats, but at that time (June 1933) no other wheat of suitable quality was available at a price suited to his purposes. The milling capacity is sufficient for the needs of the country, and the millers will see to it that imports of flour will be held at a minimum.

Hard winter wheats from the United States are suitable in milling mixtures for bread flours and can be used at prices 3 to 4 percent above prices for Plate wheats. Montana and Duluth spring wheats are held in high regard by the Danish millers, but no offers of these have been made in recent years. Red durum wheat from the United States is not wanted as it is no good for milling purposes and is thought to be too hard in texture for chicken feed. Canadian wheat from the Atlantic coast ports is considered superior in quality to that shipped from Vancouver, but because of more favorable shipping connections with Vancouver and lower freight charges, it is said that most of the Canadian wheat used comes from this latter port.

FLOUR AND BREAD CONSUMPTION

Information furnished to the writer by the Teknologisk Institut of Copenhagen indicates that Denmark consumes annually about 1,945,897 barrels (of 196 pounds) of wheat flour and grits and 1,754,682 barrels of rye flour. The fact that the former is used for a number of purposes other than bread baking, whereas rye flour is used exclusively for bread baking, leads to the conclusion that consumption of rye bread greatly exceeds that of wheat bread. This conclusion is strengthened by the fact that much of the rye bread contains some low-grade or "clear" wheat flour. According to recent information from the Institute, it would appear that the consumption of rye bread is more than three times that of wheat bread and that it has increased slightly in the last few years. Consumption of these grains for all purposes shows, however, trends in the opposite direction.

Rye bread is the bread of the masses and is much cheaper than wheat bread. In June 1933 the retail price of rye bread was 20 ore per kg (1.67 cents per pound), while that of wheat bread was 66 ore (5.52 cents per pound).

Wheat bread is a delicacy which to most people can be afforded only on special occasions. It is usually made in small loaves of 0.30 and 0.60 kg size that are shaped like the French type. Most of it is hearth-baked. It is of light texture and has a thin, crispy crust and its quality is very good. Other forms or types of wheat bread produced include rolls, zwieback, rusk, and so-called table breads. As a general rule, in the making of these various types milk is used instead of water. One of the important uses of wheat flour is in the baking of pastries, which are a specialty of Denmark. The ingredients used in making these pastries are flour, milk, egg whites, sugar, butter, yeast, and cardamon.

The rye breads are usually dark in color, close-textured, compact, heavy, and moist. They are slightly sour in taste and have a slightly aromatic smell. As in the case of pastries, these rye breads are considered a specialty of Denmark. The Danish bakers believe they have developed a technique in making rye bread that is superior to that used in other countries.

BAKING PRACTICES

The baking of rye bread in the cities is usually done in large cooperative bakeries, especially established for that purpose. The product of these bakeries is distributed among small bakeries, the owners of which are shareholders of the larger bakery. In the villages and small towns, out of reach of these special rye-bread bakeries, rye bread is baked in the same shop with wheat breads and pastries. Except as noted above, the product of the bakery is sold direct to the consumer either at the bakery shop or by some scheme of delivery service.

Bakery shops are numerous. Some are independently owned and operated and some are of the chain type, owned and operated as a distributing depot for a larger bakery. In 1929 there were about 3,500 baking concerns. Most of the business done by the shops is over the counter and involves no delivery expense.

Wrapped breads are not popular. Consumers require fresh bread and want to see the loaves. From the standpoint of sanitation, wrapping is not considered necessary, as strict sanitary regulations are enforced

in regard to salesrooms and the handling of bakery products. One regulation requires that bread delivered to a consumer from a wagon must be carried in a white cloth. On June 1, 1921, a law became effective which prohibited the use of night labor in bakeries, so that mechanical means for baking have increased. This is especially true in regard to the large rye-bread bakeries. The smaller shops usually have only a kneading machine and a dough divider. Data from the Copenhagen Teknologisk Institut showing the approximate normal composition of rye flour and wheat flour suitable for Danish breads of the most usual types were used in making table 16.

TABLE 16.—*Normal composition of rye and wheat flours suitable for Danish breads of the usual type*

Kind of flour	Dry matter	Nitrogen	Protein N \times 5.7	Ash	Raw fat ex- tracted by ether	Fiber	Pento- sans	Starch
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Rye for coarse rye bread	86.15	1.52	8.66	1.49	3.78	1.00	7.75	61.52
Wheat for wheat bread	87.20	2.30	12.65	0.50	1.14	0.12	2.59	70.20

Danish bakers, in order to meet the demand of consumers for fresh bread in the early part of the day, have adopted the following procedures in baking. The one method aims at as short a fermentation as possible and the other at a prolongation of fermentation beyond the normal time in order that the fermentation process may be allowed to take place during the hours from 8 p. m. to 4 a. m., when the law prohibits the employment of labor. The formula and baking procedure followed in the various baking methods used are as follows (formulas calculated on 100 kg of flour):

SHORT-FERMENTATION METHOD

100 kg wheat flour of high protein content.
65 kg skim milk.
 $\frac{1}{2}$ kg salt.
1 kg pure lard.
1 kg low diastatic extract of malt (150° Lintner).
4 kg compressed yeast.
Temperature of the dough, 32° C.
Consistency of the dough, firm.

The kneading lasts about 20 minutes to insure that the yeast is well mixed into the dough. Then the dough is allowed to ferment about 20 minutes, after which it is punched and shaped or molded into oblong pieces and put in a damp proofing cupboard for proofing. When proofing has proceeded to the desired point, the doughs are placed in an oven which, during the first 10 minutes of the baking process, is under heavy steam. The temperature of the oven is about 220° C. The weight of the loaves is 0.30 and 0.60 kg.

NORMAL-FERMENTATION METHOD

100 kg wheat flour of normal composition.
60 kg skim milk.
1 kg salt.
1 kg pure lard.
 $\frac{1}{2}$ kg low diastatic extract of malt (150° Lintner).
Temperature of the dough, 28° C.
Consistency of the dough, normal.

After kneading, the dough is allowed to ferment an hour; is punched, fermented another hour; punched, fermented a half hour; is punched, molded, then proofed and baked. The proofing and baking is as described in the procedure for the short-fermentation method.

PROLONGED-FERMENTATION METHOD

100 kg wheat flour, principally of soft wheat.
55 kg skim milk.
 $\frac{1}{2}$ kg salt.
 $\frac{1}{2}$ kg low diastatic extract of malt (40° Lintner).
Temperature of the dough, 23° C.
Consistency of the dough, very firm.

The dough is placed, for fermenting, in a room where the temperature is about 25° C. It is coated with pure lard to prevent crust formation, and is not punched or touched until after 8 hours, when it is given a slight punching; it is then molded, proofed, and baked as described in the preceding methods. The temperature for baking is about 200° C.

In making the small or piece types of bread, such as rolls and the so-called table breads, the following formulas and procedures are used:

ROLLS

1½ kg wheat flour of high-protein content.
1 liter milk 35° C.
100 g compressed yeast.
50 g margarine or pure lard.
20 g extract of malt.
Temperature of the dough, 28° C.
Consistency of the dough, soft.

After 1½ hours fermenting with two punchings, the doughs are molded and placed in a proofing cupboard under steam for about 20 minutes. Then they are placed on plates, sprinkled with water, and inserted in the oven. The baking takes place in an oven under steam for about 20 minutes with oven temperature about 220° C.

TABLE-BREAD TYPES

One and one-half kilograms of wheat flour, principally of hard wheat, is mixed with 1 liter of milk, 50 grams of compressed yeast, and 20 grams of salt.

After the ingredients have been kneaded into a dough of normal consistency at a temperature of 25° C., the dough is allowed to ferment for 1 hour; it is then given a strong punching, allowed to ferment one-half hour; is again punched, and allowed another one-half hour fermenting, after which it is ready for further treatment. To each kilogram of this prepared dough is added 100 g of butter, as a rule the same quantity of margarine, 50 g of sugar, 1 egg, 50 g of compressed yeast, a little cardamon, and as much wheat flour as is necessary for producing a dough that can be termed firm. After this preparation, the dough is kept for about 1 hour, is punched, then shaped, and baked.

DIETARY HABITS

No special inquiries were made regarding the dietary habits of the Danish people, but it is well known that they are hearty eaters. Bread, potatoes, eggs, and pork are the main foods. Hors d'oeuvres are much used. The Danes are a leisurely people and have been

accustomed to linger over their meals. Recently in Copenhagen, however, a number of restaurants of the automat type have been established and are popular with the poor and the middle classes. Here the people spend less time and usually eat and drink less. It is possible that the success of these restaurants may ultimately influence other restaurants to develop short-order service.

FRANCE

France is 207,054 square miles in size (about 50,000 square miles smaller than the State of Texas) and has a population of more than 42,000,000. Wheat is this country's principal crop and is the grain mainly used in the production of the bread consumed by the French people. Rye is used to some extent in bread making, but only in a very few sections is its use for that purpose of any importance. In per-capita consumption of bread France ranks among the world's highest.

BREAD-GRAIN PRODUCTION

During the 5-year period 1929-33 the annual harvested area of wheat averaged 13,277,000 acres, production 305,066,000 bushels, and acreage yield 23.0 bushels (table 17). Compared with the preceding 5-year period the acreage harvested has declined only by 20,000 acres, while production and yield per acre have increased, the former slightly less and the latter slightly more than 9 percent. On the other hand, if the 1929-33 averages are compared with those for the 1909-13 pre-war period, it will be seen that the area harvested and production have decreased about 20 and 6 percent, respectively, whereas acreage yield has increased about 17 percent.

TABLE 17.—Acreage, production, yield per acre, trade, and apparent utilization of wheat in France, average 1909-13, 1924-28, 1929-33, annual 1929-33

Year	Acreage			Production	Yield per acre	Imports ¹		Exports ²		Apparent utilization ³	
	Winter	Spring	Total			Wheat	Flour ⁴	Wheat	Flour ⁴	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:					chs	bushels	bushels	bushels	bushels	bushels	chs
1909-13					19.7	11,264	558	49	1,154	309,263	9.3
1924-28	12,861	496	13,357	286,130	21.4	47,160	483	233	1,855	326,635	8.0
1929-33	12,744	497	13,241	305,066	23.0	51,223	1,203	3,753	11,010	315,729	8.3
Annual:											
1929	12,956	380	13,336	337,252	25.3	37,634	837	10,619	7,496		
1930	12,763	515	13,278	228,108	17.2	65,609	1,320	5,800	16,356		
1931	11,725	1,115	12,840	264,117	20.6	94,691	620	14	12,555		
1932	13,115	283	13,398	333,524	24.9	46,860	1,121	82	9,022		
1933	13,139	191	13,330	362,339	26.8	28,322	2,115	2,213	9,751		
1934	12,803	339	13,142	338,513	25.4	25,585	3,537	35,621	9,879		

¹ Year beginning Aug. 1 for 1909-13; July 1 for others.

² Converted to grain on basis of 4.5 bushels of grain per barrel of flour.

³ Stocks at the beginning and end of periods are disregarded.

⁴ Winter and spring wheat do not add to total, due to upward revision received for total only.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 18.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in France, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13.....	3,095	52,591	17.0	3,329	20	55,810	1.4
1924-28.....	2,024	36,403	18.0	1,708	124	37,987	.9
1929-33.....	1,781	32,717	18.4	1,869	7	34,579	.8
Annual:							
1929.....	1,837	36,463	19.8	439	12		
1930.....	1,846	28,393	15.4	4,286	19		
1931.....	1,782	29,518	16.6	3,333	1		
1932.....	1,732	33,876	19.6	1,098	1		
1933.....	1,706	35,337	20.7	219	1		
1934.....	1,694	32,983	19.5	61	6		

¹ Year beginning July 1, except 1909-13, which begin Aug. 1; flour included, converted on the basis of 6 bushels of grain per barrel of flour.

² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Rye production in France during the 5-year period 1929-33 averaged 32,717,000 bushels, which represents a reduction of nearly 38 percent from the 1909-13 production average (table 18). In acreage harvested an even greater reduction, approximately 42 percent, has occurred, whereas in acreage yield there has been an increase of approximately 8 percent.

IMPORTS AND EXPORTS OF WHEAT AND RYE

Under normal conditions the importation of wheat and flour is not confined to the quantity needed to make up any deficiency in production that might occur, but amounts to considerably more. The reason is that French wheats are deficient in baking strength. To produce bread flour of satisfactory quality, milling mixtures must contain some foreign wheat of strong quality. Besides the foreign wheat needed for the production of bread flour, a considerable quantity of durum wheat must be imported for the production of semolina for macaroni and other alimentary pastes. French wheat is entirely unsuited for this purpose, consequently only foreign or colonial wheats are used. The foreign wheat needed for these purposes is imported almost exclusively in the form of grain.

During the period 1909-13 annual imports of wheat and wheat flour (this latter in terms of grain) averaged about 45,000,000 bushels, which represented approximately one-eighth of the total of these commodities utilized (table 17). Annual imports of wheat and flour during the period 1924-28 averaged approximately 47,500,000 bushels and during the period 1929-33 approximately 55,500,000 bushels, or an increase of 8,000,000 bushels over the preceding period. This is a considerable increase and is hard to justify, especially since the average annual domestic production of wheat between these two latter periods had increased about 25,000,000 bushels.

However, a study of annual import statistics shows that during the last 2 years of the 1929-33 period imports decreased greatly. This decrease was the result of the drastic restrictions placed on wheat and flour imports from foreign countries.

The increase in imports certainly was not entirely due to increased consumption, because during the latter part of the 1929-33 period domestic stocks¹² of wheat increased at an inordinate rate.

Formerly the excess in wheat imports over the actual quantity required to meet any deficit occurring in domestic production was balanced by exports of domestic wheat and flour. But during recent years, because of the oversupply of wheat in many parts of the world, it became difficult to find a foreign market for French wheat and flour. Stocks of domestic wheat accumulated to such an extent that there was a virtual prohibition of the importation of foreign wheat and flour for domestic consumption.

France's foreign trade in rye, only slightly important compared with that in wheat, consists of both imports and exports, with the former almost always the larger. There is a wide variation in this trade from year to year, ranging in the case of imports from almost none up to 10,000,000 bushels (in 1920-21) and in the case of exports from none up to slightly more than 1,000,000 bushels in 1921-22 and 1923-24.

CHARACTERISTICS AND QUALITY OF FRENCH WHEATS

French wheats are predominantly of winter habit, red color, and soft texture. They are of the soft red winter type and are generally of weak quality. None is of distinctly hard texture or strong quality. Very little spring wheat is produced. The wheats of northern France are usually considered to be superior in quality to those produced in the southern part of the country.

The usual moisture content of wheats grown in northern France is 15 to 16 percent and in southern France 14 to 15 percent; it varies from season to season, depending on weather conditions at the time of harvest. Owing to unusually dry weather during the harvest seasons of 1932, 1933, and 1934, the moisture content of the wheat of these crops has averaged somewhat lower than that for the general run of the wheat crops.

The protein content of French wheats is generally low, probably averaging not more than 8 percent on the basis of a 13.5 percent moisture content. In both quantity and quality of gluten the 1932, 1933, and 1934 crops have been above the average of preceding years.

The average natural weights of wheat in terms of kilograms per hectoliter reported for the crops from 1909 to 1933 are shown in table 19.

¹² Gordon P. Boals, assistant agricultural attaché, American Embassy, Berlin, in a typed report of Jan. 25, 1935, entitled "Continental European Grain Stocks Situation", estimates that 650,000 metric tons (23,883,000 bushels) is a normal wheat crop carry-over for France, but he states that the wheat carry-over from the 1932 crop was about 1,800,000 to 2,000,000 metric tons (66,138,000 to 73,467,000 bushels) and from the 1933 crop more than 3,000,000 metric tons (110,230,000 bushels).

TABLE 19.—Average weight per hectoliter for the French wheat crops of 1900-33

Year of harvest	Average natural weight per hectoliter	Year of harvest	Average natural weight per hectoliter	Year of harvest	Average natural weight per hectoliter	Year of harvest	Average natural weight per hectoliter
	Kilograms		Kilograms		Kilograms		Kilograms
1900	77.88	1916	76.65	1922	76.90	1928	76.91
1910	75.79	1917	75.29	1923	77.30	1929	76.97
1911	78.99	1918	78.07	1924	75.35	1930	74.66
1912	76.78	1919	77.27	1925	75.28	1931	75.36
1913	76.83	1920	75.65	1926	75.44	1932	75.33
1914	77.26	1921	77.56	1927	74.96	1933	77.09
1915	76.42						

Compiled as follows: 1900 to 1920, inclusive, from *Statistique Agricole Annuelle* 1920; 1930 to 1933, from *Journal Officiel*, Sept. 10, 1933.

Gardie is found in some French wheat, but seldom to any appreciable extent. Weed seeds are present in the grain to some extent, but on the average not in percentages as high as in United States soft red winter wheats. In hilly sections where the ground is stony the wheat when marketed usually contains small stones.

On the larger farms the wheat is cut with a binder. The cut grain is then put in shocks. When the shocked grain becomes sufficiently dry to store safely, it is stacked in the field usually without covering other than that afforded by the straw itself. Among the peasant farmers whose farms are generally quite small, hand methods of harvesting are used. As a general practice these farmers store their grain crop in barns instead of stacking it in the field. Their crops are small and do not require much space for storage.

After the close of the World War, in order to restore the country's pre-war wheat production capacity, the growing of high-yielding varieties was encouraged. Recently, there has been a change of policy in this regard with the result that the Government is now concerning itself with the introduction of varieties of good quality. The milling industry has been demanding this change for some time. But millers are not inclined to buy domestic wheats on a quality basis, and therefore it is not probable that much progress can be made in this direction unless the better quality varieties advocated are of a yielding capacity equal to the varieties of low quality. Moreover, climatic conditions are not conducive to the production of wheat of such outstanding quality as to warrant much price differentiation.

According to an official catalog of wheat varieties published September 15, 1933, approximately 600 different varieties were being grown in France. This indicates that there is very little standardization in the selection and distribution of seed. According to a commercial miller of wide experience more care is exercised in the selection of seed wheat in northern France than in southern France. This he attributes to the larger size of the farms in the north and to the greater progressiveness of the farmers in that part of the country.

Although it is probable that France may not be able to improve the quality of its wheat production completely to satisfy its requirements for high quality or special types, it is possible that production of wheat in its colonies may be improved within a comparatively few years to such an extent that a large portion of these requirements can be taken care of from these sources. Some wheat of excellent quality

is already arriving from certain of its colonies, and with the crop-improvement work that is under way there it is very probable that the quantity of high-quality wheat from this source will increase rapidly. Possibilities of improvement in quality in colonial wheats more particularly apply to durum wheats for use in the manufacture of semolina than to bread wheats, but even in the case of the latter considerable improvement in quality may be effected in the near future.

GOVERNMENT REGULATIONS AFFECTING THE MILLING AND GRAIN TRADES

For a long time France has followed the policy of protecting and aiding its wheat farmers. This policy has had two main objectives - to make the farmers more prosperous and to stimulate production of this grain to a self-sufficiency basis. The means employed to accomplish these objectives have included such devices or measures as import duties, import quotas or contingents, import licenses, milling and mixing regulations (tables 20 and 21), price-fixing, production and mill-processing taxes. These measures have in one way or another affected the milling and grain trades. Another device or measure affecting the milling and grain trades which should be mentioned here is the one dealing with the "admission temporaire" import privilege. This is an arrangement whereby millers are granted permission to import foreign wheat either for the purpose of milling for reexport, or for domestic consumption in exchange of exports of flour and mill feed produced from domestic wheat.

TABLE 20.—*Compulsory limitations for French millers, on the use of domestic and foreign wheats for the production of bread flour, 1929-35¹*

Date effective	Minimum domestic wheat required		Maximum foreign wheat permitted		Date effective	Minimum domestic wheat required		Maximum foreign wheat permitted	
	Percent	Percent	Percent	Percent		Percent	Percent	Percent	Percent
Dec. 5, 1929, to July 26, 1930	97	3			Mar. 15 to 19, 1932	70		30	
July 27, 1930, to Apr. 11, 1931	99	10			Mar. 20 to 24, 1932	65		35	
Apr. 15 to 17, 1931	85	15			Mar. 27 to Apr. 1, 1932	60		40	
Apr. 18 to 27, 1931	80	20			Apr. 2 to May 7, 1932	55		45	
Apr. 28 to June 16, 1931	75	25			May 8 to 21, 1932	50		50	
June 17 to 30, 1931	70	30			May 22 to 27, 1932	55		45	
July 1 to 3, 1931	75	25			May 28 to June 16, 1932	50		50	
July 4 to 6, 1931	80	20			June 17 to 23, 1932	55		45	
July 10 to 21, 1931	85	15			June 24 to 29, 1932	60		40	
July 22, to Nov. 21, 1931	90	10			June 30 to July 9, 1932	65		35	
Nov. 22, 1931, to Jan. 30, 1932	95	5			July 10 to 19, 1932	75		25	
Jan. 31 to Feb. 8, 1932	90	10			Aug. 2 to 13, 1932	85		15	
Feb. 9 to 12, 1932	85	15			Aug. 14 to Dec. 1, 1932	97		3	
Feb. 13 to 21, 1932	80	20			Dec. 2, 1932, to Apr. 15, 1933	99		1	
Feb. 22 to Mar. 13, 1932	75	25			Apr. 16, 1933	100		0	

¹ Includes wheats from French colonies and to a limited extent wheats from French protectorates.

TABLE 21.—*Compulsory limitations, for French millers, on the use of domestic and foreign wheats for the production of semolina, 1930-35¹*

Date effective	Minimum domestic wheat required		Maximum foreign wheat permitted	
	Percent	Percent	Percent	Percent
July 18, 1930, to July 14, 1931		70		30
July 15, 1931, to July 31, 1932		80		20
Aug. 1, 1932		97		3

¹ Includes wheats from French colonies and to a limited extent wheats from French protectorates. Durum wheats are used chiefly.

Compulsory limitation of flour-extraction percentages have been as follows:

Decree of November 20, 1927.—Extraction percentage fixed at 1 kg below the specific weight of grains. Example: Wheat of 78 kg specific weight—extraction percentage 77 percent.

Decree of December 5, 1928.—The provisions of the decree of November 20, 1927, relative to extraction percentages suspended.

Law of December 1, 1929.—Article 1, paragraph 3. The Minister of Agriculture is empowered to fix by decree the limits of extraction percentages for baking flour destined for domestic consumption.

Decree of September 27, 1932.—The extraction percentage for flour limited to a maximum of 66 percent.

Decree of December 11, 1932.—The preceding decree suspended.

Decree of September 6, 1933.—The maximum extraction percentage fixed at 11 kg below the specific weight of the wheat milled.

Decree of January 16, 1934.—The maximum extraction percentage fixed at 12 kg below the specific weight of the wheat milled.

Decree of April 28, 1934.—Until December 31, 1934, the maximum quantity of baking flour which the miller extracts from 1 quintal of wheat must not exceed the hectoliter weight of the aforementioned grain reduced by 14 kg and must, in no case, surpass 65 kg.

All of these measures or devices have not been applied at one time, but were put in operation at various times over a period of several years and were occasionally changed. At first the chief concern of the Government was to stimulate domestic wheat production and to support the domestic wheat market in order to make wheat farming profitable. During recent years, however, the accumulation of unusually large stocks of domestic wheat as the result of a succession of several large domestic crops and of a depressed world market has necessitated a reversal of the policy regarding production so that instead of encouraging production France has found it necessary to take steps to discourage further increases in it. The reduction of this wheat surplus was attempted mainly through the subsidization of wheat exports and denaturing.

MILLING PRACTICES

According to official statistics published in 1931, the number of mills in France is as follows:

	Number
Roller mills.....	5,482
Stone-buhr mills.....	2,459
Small wind- and/or water-power mills.....	10,444
Total.....	18,385

Most of the mills in the two groups, stone-buhr mills and small wind-and/or water-power mills are probably of an obsolete character. Most of them, no doubt, operate only on a strictly custom or grist-grinding basis and probably none of the mills in these two groups is very important from the standpoint of production. All the important commercial mills are probably included in the roller-mill group, and it is with these mills that the discussion which follows will be concerned.

There are some large and well-equipped mills as modern as any to be found anywhere. There are, on the other hand, many French roller mills, some rather large, which are very poorly equipped; some have machinery of a period dating back to the time when the roller process of milling was first inaugurated.

Milling is less standardized than in most other European countries or in the United States. No system can be said to be typically French.

Some mills use the English system, some the German system, and others use a mixture of the systems employed in other countries.

The important milling centers are at Marseille, Paris, Le Havre, and Strasbourg. The largest mills are located at Paris and Strasbourg. It is reported that the mills of Marseille have a total grinding capacity of 1,600 metric tons (59,000 bushels) of bread wheat and 1,000 metric tons (37,000 bushels) of durum wheat per 24 hours.

All mills that have used foreign wheats in years past are equipped with wheat washers, conditioners, and a sufficient assortment of cleaning devices for removing most kinds of foreign matter. The large mills have laboratories, a few of which are up-to-date, but as a general rule laboratories are not so much used in French mills or so well equipped as in England, Germany, Sweden, and a few other European countries. Gluten tests by the Chopin extensimeter method and moisture and ash determinations constitute the principal work of the laboratories. Protein content is given practically no attention by the millers. Ash content has become important only because of its inclusion in recent years in Government specifications for domestic and export flours. The Pekar test is also used by the Government for determining the quality of flour. In making this test a certain quantity of pyrean etching is mixed with the water in which the flour is immersed. The presence of this material in the water has a coloring effect on the impurities present in the flour, tending to make them more noticeable.

It is claimed that flour extraction percentages before the World War were about equivalent to the kilogram-per-hectoliter weight of the wheat milled. After the war, until limited by governmental decree, the extraction percentage tended slightly downward to a figure approximately 2 less than the kilogram-per-hectoliter weight of the wheat.

It is said that flour marketed in France may not have so high a moisture content as those marketed in England since flour does not go into consumption so soon after milling in France as in England. One miller interviewed stated that the moisture content of flour for consumption should not exceed 14.5 percent in the summer and 15.5 percent in the winter.

One miller stated that the storage capacity at most interior mills was equivalent to 5 to 6 weeks' supply of wheat but that the storage capacity at the port mills was generally somewhat larger. Under normal conditions the stocks of wheat usually carried represent about three-fourths of the storage capacity. Millers who grind only domestic wheat make a practice of carrying a stock of old wheat over into the new crop year for blending with the new wheat, but this practice is not followed by millers who use foreign wheat in their milling mixtures.

As a general rule the baking trade does not require a strong flour. In most sections flours of relatively weak quality are deemed satisfactory but fairly strong flours are demanded in Alsace-Lorraine, in the Rhone River Valley, along the Mediterranean coast line, and in the Atlantic seaport towns. A wheat mixture consisting of 70 percent domestic wheat and 30 percent United States hard red winter is generally considered suitable for the production of flour; but if the percentage of foreign wheat used is between 30 and 15 percent, it is considered necessary to include some foreign wheat of stronger baking characteristics; and if less than 15 percent of foreign wheat is used,

all of it must be of the best quality. The types of foreign bread wheats best suited for milling requirements are hard wheats of the United States, Canada, and Union of Soviet Socialist Republics. Argentine and Danubian wheats, except those of the very best quality, are not so suitable. Australian wheats are generally too weak to be useful in milling mixtures.

In the production of semolina for macaroni purposes Canadian durum wheat is given first preference and United States number durum second. North African durum wheats, because of their variable quality and mixture of types, are not considered very desirable, but present Government regulations require their use by French durum wheat mills almost to the exclusion of other durum wheats. The milling of durum wheat is chiefly confined to the Mediterranean coast district. Marseille is the chief milling center for the production of durum wheat semolina.

The bleaching or treating of flour by the use of chemicals was prohibited about 1933. It is reported that this action was taken because such practices were considered harmful to the health of the people.

BAKING PRACTICES

Practically all bread is baked in commercial bakeries. Home baking is practiced only in out-of-the-way country locations.

According to an official of the French Milling School, there are only five or six modern bakeries of the factory type in France. One of these, the Grand Boulangerie de la Seine in Paris, has a production capacity of 30,000 kg of bread per day. Another of about the same capacity located in Paris is operated by the Government for the production of bread for use in Government-supported institutions in the Paris districts.

Most of the bread and other bakery goods are produced in small bakeries, of which there are said to be approximately 45,000, with 3,600 of them in the Paris district. The French consumer demands strictly fresh bread with his meals and particularly for breakfast. This requirement can be met only when the bakery is quite near the consumer; it constitutes a serious handicap to the factory type of bakery which, because of its wholesale production, must market its product over a relatively large area. A further handicap to the large bakery is the governmental restriction on night work which, although applying to all bakeries alike, does not affect the small bakery so much as the large because of the direct relationship of time to distance in the service to the customer.

It is a common practice in many rural sections for bakers to exchange bread for wheat with farmers. Some bakers give as much as 65 kg of bread for 80 kg of wheat.

The small bakeries are in most instances less sanitary than those of Germany, Denmark, and other western European countries. Also they employ less machinery.

Nearly all of the bread is hearth-baked, and little of it is of the pan-loaf type. The hearth-baked loaves are either of the long slender style or of the round flat or ham-shaped style. The latter is common in some parts of France, but the slender loaf is the more general style, especially where fresh breads are easily obtainable. The French people like a crusty bread. The long slender loaf varies in length from a few inches up to 39 inches (1 m) and is seldom much thicker

than a man's wrist. The meter-length loaves are generally of 700 g weight.

A coarse porous texture is desired. The cellular structure should be harsh or firm rather than spongy. A grayish, creamy color of crumb is preferred; whiteness is not especially desirable. The crust must be thick and crisp but not hard and must be of a dark-brown color and of glossy appearance. Much of the present bread falls somewhat short of these qualifications; in fact, some of it is poor in quality.

As a general rule the price of flour is of more concern to the baker than its quality. He likes to buy his flour on a long-term contract basis and usually gets only one kind at a time. Unlike the German baker he is not inclined to mix or blend flours of different kinds. He feels that he can adjust his method of baking to produce the desirable results from almost any flour, providing he is given an opportunity to make a trial baking. Some bakers contend that the restrictions on imports of foreign wheat have not lowered the quality of their products, but they say they have had to alter their method of baking considerably and have had some difficulty in making bread of the desired quality.

Except in the higher class bake shops, where a stronger and higher grade flour is demanded for pastries than for bread, the baker uses the same kind of flour for both. Although relatively weak flours are suitable for bread-making purposes in most of France, some sections, namely Alsace-Lorraine, the Rhone River Valley, and the Mediterranean coast area, require a relatively strong flour.

Pastry- and cake-making are highly developed, and consumption is relatively large. The cakes are generally of the spongy and confection type; the pastries are of a flaky crumb type. Cakes of the tea-biscuit type are used extensively.

Ordinary French bread consists only of flour, water, salt, yeast, and in some cases malt. In some of the smaller cities and in rural districts sour dough instead of yeast is sometimes used. Where yeast is used the straight-dough method of baking is generally employed. The formula used is about as follows: Flour, 100 kg; water, approximately 60 kg; salt, 1.8 kg; and yeast, 1.0 kg. These ingredients are mixed 20 minutes, then allowed to ferment 3 hours, after which the dough is divided into loaf sizes and proofed for about 40 minutes. The baking is done at a temperature of about 250° C, and takes approximately 30 minutes for loaves of ordinary size.

According to law, the authority to fix bread prices is conferred on the prefects of the various Departments. In actual practice, however, bread prices are generally fixed by a council or committee on which the milling and baking industries, the consumers, and the Government are represented. Each district or Department has its own price-fixing council. Prices are fixed for both fancy and common breads.

The schedule of bread prices prevailing in Paris and the Seine Department on March 11, 1934, was:

Retail Prices for Ordinary Bread

<i>Grams</i>	<i>Francs</i>
250.....	0.50
500.....	1.00
750.....	1.50
1,000.....	2.00
Rolls or crescents, each.....	.30

Retail Prices for Fancy Bread

	<i>Francs</i>
Long-rolled loaf bread (700 g)	2. 00
Short loaf bread (300 g)	1. 00
Bread sticks (300 g)	1. 05
Bread sticks (100 g) .....	. 55

If the size of the rolled bread (of 700 g) is extended to 1.10 meters, the price is increased by 10 centimes, and in case of delivery to the home the above prices are increased by 10 centimes.

Another class of food products derived from wheat, quite extensively used, includes noodles, macaroni, and similar pastes. Except in the case of noodles, these products are chiefly used in the section bordering the Mediterranean Sea. According to a statement made to the writer by a high official of a French semolina millers trade organization, the annual consumption of macaroni and similar pastes has declined materially since 1930. He attributed the decline chiefly to the quality deterioration of these products resulting from the restrictions placed on the importation of durum wheat from foreign countries. The quality of most of the durum wheat obtained from the French north African colonies, almost the sole source of supply for durum wheat millers since the middle of 1932, is not generally suitable for the production of high-quality macaroni.

It is unofficially reported that the per-capita consumption of bread has declined 10 percent since the war, but the French are still said to be among the world's greatest bread eaters.

DIETARY HABITS

The French are known for their cooking and for the importance they attach to food. For the workman, for instance, decent food is more important than clothing. The French are not big eaters, but they want their food to be well prepared and of good quality. There are three meals--breakfast, lunch, and dinner.

In cities, the so-called "petit déjeuner" (breakfast) comes at about 7:30 a. m., and for well-to-do people consists of café crème (strong coffee with milk), rolls, so-called "brioissants" (crescents) and brioches (a kind of bun) with butter. For people of the working classes this meal simply consists of café crème and bread and butter. It is customary for unmarried men and working people to take this meal at small neighborhood coffee houses where frequently they drink their coffee and eat their rolls standing up.

Lunch (déjeuner) is served from 12 m. to 1:30 p. m. and for the upper middle classes consists of hors d'oeuvres, meat, vegetables, fruit and cheese, bread and wine. Coffee is usually served at the conclusion. For the workmen and the lower middle classes this meal consists of meat, potatoes, cheese, coffee, bread, and wine. Even the simplest worker usually has his hot meal in the middle of the day and does not carry his lunch with him as is customary in several other European countries. Workmen as well as employers have their midday meal at a restaurant and spend about 1½ to 2 hours over it.

There is no afternoon meal, but children have a so-called "goûter" (a bite) consisting of chocolate or café au lait with bread and butter at about 4 p. m.

The big meal of the day is the dinner, served at 7 p. m. and consisting, for the upper middle classes, of hors d'oeuvres, soup, fish and vegetables, meat or poultry, a dessert, and cheese. Bread and wine are also served. For workmen and the lower middle classes this meal consists of soup, meat, vegetables, cheese, bread, and wine.

Dietary habits in the country are similar to those in cities, only less meat and more bread, vegetables, and potatoes are used. Except for breakfast, which is taken earlier in the morning, meals in the country are served at the same hours as in towns. During the season when the farmer is planting, tending, and harvesting his crops the midday meal is served in the fields.

In towns only white bread is consumed, while in the country gray bread is eaten. This kind of bread, is, however, not popular with town people.

GERMANY

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Germany has a population (1934) of approximately 66,000,000 people and an area of 181,004 square miles (about one-seventh larger than California). Rye production has always exceeded that of wheat. Since the World War, however, rye production has tended slightly downward, whereas wheat production has tended slightly upward but the rye crop is nearly twice the size of the wheat crop (tables 22 and 23). During the 1929-33 period, the annual production of wheat averaged approximately 162,000,000 bushels and of rye 312,000,000 bushels, whereas during the period 1909-13 the annual production of those grains averaged 131,000,000 and 308,000,000 bushels, respectively. These figures show that from the 1909-13 period to the 1929-33 period wheat production had increased over 30,000,000 bushels, whereas rye production had decreased 56,000,000 bushels.

TABLE 22.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Germany, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ²		Apparent utilization ³	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ⁴	Wheat	Flour ⁴	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bu.	1,000 bu.	1,000 bu.	Bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	Bu.
Average:													
1909-13 ⁵	3,691	401	4,092	101,875	11,116	112,991	32.6 90,139	800,11,215	9,019	199,349	3.0		
1924-28	4,435	550	5,015	143,643	18,472	162,115	32.2 77,731	9,591	8,043	3,066	189,183	3.0	
1929-33	4,435	550	5,015	143,643	18,472	162,115	32.2 35,412	630	11,547	4,086	181,923	2.9	
Annual:													
1929	3,632	323	3,955	112,687	10,375	123,062	31.1 66,213	1,745	4,182	3,021			
1930	4,607	405	5,012	126,622	12,586	139,207	31.6 30,346	507	449	370			
1931	4,653	362	5,015	134,699	20,737	155,436	29.0 33,778	512	12,181	148			
1932	4,833	352	5,185	160,057	13,773	173,830	32.6 33,780	269	24,885	4,405			
1933	5,011	716	5,727	181,010	24,880	205,920	35.0 27,941	119	20,040	12,479			
1934	4,068	762	5,430	145,033	21,508	166,541	30.7 14,567	176	1,057	2,400			

¹ Year beginning July 1, except 1909-13, which begin Aug. 1.

² Flour converted to wheat on basis of 4.5 bushels of grain per barrel of flour.

³ Stocks at the begin. and end of periods are disregarded.

⁴ Acreage and production figures have been adjusted to correspond with later years but trade figures have not.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 23.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Germany, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports	Exports	Apparent utilization	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13 ¹	12,713	288,837	23.0	16,226	43,936	340,627	5.2
1924-28	11,383	279,940	24.6	17,220	12,483	281,677	4.5
1929-33	11,257	311,832	27.7	9,023	10,378	310,477	4.8
Annual:							
1929	11,680	321,045	27.5	5,635	20,481		
1930	11,611	302,312	26.0	1,233	3,518		
1931	10,789	262,977	24.4	18,075	4,393		
1932	10,905	322,255	29.9	15,808			
1933	11,179	313,570	30.7	4,961	10,112		
1934	11,007	299,406	27.0	9,444	497		

¹ Year beginning July 1; flour included, converted on the basis of 6 bushels of grain per barrel of flour.² Stocks at beginning and end of periods are disregarded.³ Acreage and production figures have been adjusted to correspond with later years, but trade figures have not.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Rye production is generally sufficient for domestic needs, but wheat production usually is not. For a number of years Germany has been striving to attain self-sufficiency in wheat production and in the bumper crop of 1933 that goal was reached for the year. The Government has recently come to realize, however, that it is neither desirable nor profitable to use domestic wheat to the entire exclusion of foreign wheat; accordingly, the production policy now pursued is to strive toward a greater degree of self-sufficiency in feed grain rather than in bread grains.

Because of western Germany's proximity to ocean-transportation connections through which foreign wheat of superior baking quality is readily obtainable, and because the principal consuming area of the country is in the west whereas the principal wheat-producing area is in the east, the millers in western Germany in years past have found it more advantageous to import foreign wheat to make up any deficit in local supplies than to transport domestic wheats from surplus areas of the country. As a consequence, imports into Germany have generally greatly exceeded the quantitative discrepancy between crop production and consumption requirements. This, in turn, has necessitated the exportation of certain quantities of domestic wheat.

Annual imports during the pre-war period 1909-13 averaged 91,000,000 bushels and exports 23,000,000 bushels. During the 5-year period 1929-33 annual imports averaged 39,000,000 bushels and exports 16,000,000 bushels. The decline shown here in imports is due in part to an increase in production of over 30,000,000 bushels, in part to the drastic restrictions which have been placed on imports of foreign wheat during the latter period, and in part to a decrease of about 15,000,000 bushels in apparent annual consumption.

During the period 1909-13 apparent annual consumption of wheat averaged 199,000,000 bushels; of rye 341,000,000 bushels. During 1929-33, annual consumption of these grains averaged 185,000,000 and 310,000,000 bushels, respectively. Thus, wheat consumption decreased by 14,000,000 bushels and rye consumption by 31,000,000

bushels. On a per-capita basis, consumption of wheat declined from 3.0 bushels in 1909-13 to 2.9 in 1929-33; rye consumption declined from 5.2 to 4.8 bushels. Just what significance there is in these declines and in the fact that the decline in the case of rye was appreciably greater is not known.

Wheat is used almost wholly for the production of flour for human consumption, whereas a considerable quantity of rye is used for animal feed. The principal use of both of these grains is in the production of flour for human consumption. According to data published by the Institut für Landwirtschaftliche Marktforschung (table 24), wheat utilization for human consumption has recently been losing some of its importance in relation to rye. Formerly wheat was believed to be gaining in importance as a human food, but this trend was arrested and then reversed by conditions brought about by the depression.

The decreased purchasing power of the people, unemployment of large numbers, and drastic restrictions on foreign-wheat importation which has resulted in lowering the quality of the bread and rolls produced, have no doubt been responsible for much of the decline. Should prosperous times return and import restrictions be greatly reduced or removed, it is probable that the utilization of wheat as a human food would again increase in importance in relation to rye.

TABLE 24.—*Estimated consumption of grain in Germany according to utilization purposes*

GRAIN FOR HUMAN CONSUMPTION									
Commodity	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
Wheat.....	4,960	5,070	5,291	5,622	5,677	5,401	4,740	4,520	4,409
Rye.....	5,512	5,422	5,512	5,291	5,129	5,291	5,622	5,401	5,401
Other grains.....	215	245	245	245	245	245	245	245	245
Total.....	10,720	10,910	11,051	11,161	11,051	10,940	10,610	10,169	10,053

CONSUMPTION OF GRAIN FOR INDUSTRIAL PURPOSES ¹									
Barley.....	1,155	1,330	1,392	1,477	1,560	1,672	1,240	923	827
Other grains.....	176	138	300	336	220	182	171	143	110
Total.....	1,310	1,468	1,701	1,813	1,780	1,754	1,411	1,066	937

CONSUMPTION OF GRAIN AND POTATOES FOR FEEDING PURPOSES									
Oats.....	6,338	6,063	6,773	6,503	6,063	6,559	6,068	6,173	6,421
Barley.....	1,981	2,450	3,417	3,307	3,086	3,472	2,646	2,645	2,012
Rye.....	882	2,315	1,663	1,573	1,709	1,874	2,590	1,764	2,783
Maize.....	521	413	1,626	1,598	772	717	496	772	165
Wheat.....	165	165	165	356	331	165	165	356	744
Mixed grain.....	490	490	441	551	606	601	551	606	602
Mill offals ²	2,095	2,315	2,616	2,750	2,590	2,535	2,480	2,149	2,000
Potatoes ³	3,913	5,120	2,425	4,189	5,015	4,630	5,622	4,905	4,905
Total.....	16,397	19,373	19,152	21,164	20,172	20,613	20,558	19,400	19,731

¹ Chiefly for brewing and distillation purposes.

² Including rice offals. Grain equivalent: 133 kg mill offals equal 100 kg grain.

³ Grain equivalent: 400 kg potatoes equal 100 kg grain.

Compiled from Blätter für Landwirtschaftliche Marktforschung (8, p. 158).

CHARACTERISTICS AND QUALITY OF GERMAN WHEATS

Climatic conditions are well suited to the production of wheat and rye, but artificial fertilization is essential to satisfactory cropping results.

From 85 to 90 percent of the wheats are of winter habit. Practically all are of the common species (*Triticum vulgare*). Some spelt, emmer, and einkorn are grown, but the total production of these species of wheat is relatively small (4,895,523 bushels produced in 1931-32). No durum wheat is grown. Some of the winter wheats are white in color, but most of them are red; all spring wheats are red.

Most of the wheat is of soft texture and comparatively weak quality. This is particularly true of the winter wheats. Many of these soft wheats are comparable in quality to United States red winter wheats, but as they are usually of much higher moisture content they are less valuable for milling purposes. A small percentage of the wheats is of semihard or hard texture, but the quantity grown is not sufficient to fill the demands of the domestic trade. On the other hand, Germany's production of soft wheats is more than sufficient to meet the domestic demand. Thus the foreign wheats most suitable for import requirements are of the strong, hard type.

According to the statement of a German miller of considerable prominence and experience, German wheats prior to 1900 were of satisfactory quality. At about that time, because of the poor yielding propensities of these wheats, the high-yielding but poor-quality French Bordeaux and English Squarehead varieties were introduced and they gradually replaced the old German wheats. Since then, except within the last few years, these introductions have been the predominating variety types grown, which fact accounts for the weak quality of German wheats in recent years.

Shortly after the World War a number of Swedish varieties were introduced into northern Germany, but these, too, in most instances fell short of fulfilling the quality requirements demanded. In recent years, however, much work has been done by domestic wheat breeders in variety improvement so now Germany has a number of varieties that give promise of fulfilling the quality requirements for domestic use. In developing new varieties the aim has been to provide wheats of good quality and of good yielding tendencies. Resistance to winter-killing is demanded in winter wheat varieties. Several authorities state that much progress has been made but that the most marked progress in quality improvement has been in connection with spring wheats.

Variety improvement has been accomplished both by the elimination of the inferior varieties and by the development of new varieties of superior quality. One authority has stated that, whereas formerly more than 250 varieties were grown, the number now grown is only about 70. Dr. Pelshenke (10, *heft 40*) of the Institute for Plant Cultivation and Breeding at the University of Halle on Saale, which is the only official institute of the National Government for plant-breeding work, presents data in an official bulletin that would indicate that, in 1932, 13 varieties constituted 68.6 percent of the total production of winter wheat and 7 varieties 93.3 percent of the production of spring wheat. He further states that of the 13 winter wheat varieties the following are of fairly good quality in regard to gluten content and gluten quality: Rimpaus (formerly Bast), Krafft

Siergerländer, and Ackermann Bayernkoenig. The outstanding quality varieties of spring wheat he gives as being Janetzki and Heines Kolben.

Although this institution is the only one of its kind supported by the National Government, a number of private institutions throughout the country are doing plant-breeding work. An institution at Weihenstephan is supported by the State of Bavaria and works only in the interests of Bavarian agriculture. The fact that Germany grants patent rights to originators of new varieties makes the development of new varieties a profitable enterprise.

The moisture content of German wheats is usually relatively high. In wet seasons it is seldom less than 16 percent and is often 18 percent or higher and even in comparatively dry seasons, it seldom is lower than 14 percent. Wet seasons are the general rule, but the crops of 1932, 1933, and 1934 were exceptions.

In ordinary years, owing to high moisture content, there is usually a fairly high percentage of germinated wheat kernels and this has a marked influence on the milling and baking properties of domestic wheats. This damage is widespread in ordinary years and is the most prevalent form of damage in the threshed grain. Its occurrence in the 1932 and 1933 crops, however, was negligible, for in most instances the grain was harvested under dry conditions. It may be well to add that, because of the hand methods of harvesting, the cheapness of hand labor, and the small size of the usual individual farm, grain crops can be harvested in European countries without material loss in quantity or deterioration in quality under weather conditions that would be ruinous to a harvest in the United States.

Damaged kernels, other than those caused by germination, are not usually present in German wheats to an appreciable extent, except those resulting from Hessian fly and rust infestations, and these are not generally classed as "damaged" but are dealt with in connection with natural weight.

Damage from weevil infestation is rather uncommon. Stinking smut sometimes occurs, but not often, because of the consistent use of control methods for its prevention.

The foreign-material content of German wheats is relatively low. The wheat seldom has many weed seeds and is free of stones and dirt clots. It is fairly free from rye admixtures. This is not true of the wheat produced in some European countries. Apparently German farmers exercise considerable care in keeping these two grains separate.

In specific weight (test weight) there is about the same variation as in wheats grown east of the Mississippi River in the United States. In Germany and other continental European countries specific weights are given in terms of kilograms per hectoliter. Specific weight is the factor most generally used as the basis for the evaluation of German wheats. It is said that the German wheat trade generally considers 72 kg per hectoliter the minimum weight limit for wheat for use in the production of flour. On the basis of experiments conducted by the writer, the approximate equivalent of this weight in pounds per Winchester bushel, according to the United States official method of test, is 55.7.

In protein content German wheats range from extremely low to moderately high. Their average protein content is somewhere in

the neighborhood of 10 percent (basis 13.5 percent moisture). According to the investigations made by Dr. Pelschenke the 1934 wheats were decidedly higher in protein content than were those of the 1931, 1932, and 1933 crops. In reporting this investigation Dr. Pelschenke states that the samples used in his tests were gathered from all over the country according to yield and that they were without exception average samples taken from field crops and not from crops grown for experiment purposes. The number of samples from each crop used in his investigation is reported as being 3,000. It is believed that the data obtained give a fairly accurate indication of the protein content of German wheats. These data are presented in table 25 and show the percentage of samples within certain protein-content ranges. A much higher percentage of the 1933 and 1934 crop samples was in the high-protein-content group than of the 1932 and 1931 crop samples.

TABLE 25.—Percentage of samples of German wheat according to various protein contents, crops of 1931, 1932, 1933, and 1934

Range in protein content (percent: $N \times 5.7$ (basis 13.5 percent moisture))	Crop of 1931	Crop of 1932	Crop of 1933	Crop of 1934
	Percent	Percent	Percent	Percent
Under 8.5	6.1	20.4	9.6	7.3
8.6 to 10.3	58.6	55.5	46.7	32.5
10.4 to 11.2	22.2	15.7	21.9	11.4
Over 11.2	13.3	8.4	21.1	48.1

¹ In the original text the protein content ranges are presented on a moisture-free basis.

Compiled from Das Muehlenlaboratorium, Beilage zur Wochenschrift, Die Muehle, 1932-33 (10, Heft 40, 1933; Bd. 3, Heft 10, 1933).

GRAIN TARIFFS

The history of a protectionist grain policy dates back to the middle of the last century. At that time Germany produced more bread grain than was needed for domestic consumption, but duties were imposed on imports of grain. Shortly after the middle of the century, owing to the industrial development that was taking place, Germany began to favor free trade and by 1865 all the import duties on grain had been removed. In the years that followed, Germany changed from a surplus grain-producing country to a deficit-producing country. In 1879, owing to the increasing competition of Western Hemisphere grain which was making the production of domestic grain very unprofitable, import duties were again imposed on grain and flour, and, except for a short period in the nineties, this policy was continued until the World War.

During the war, tariff protection was displaced by more drastic forms of trade control. As a wartime measure all foreign commerce was subjected to direct administrative control. Then when the Versailles Treaty deprived Germany of freedom of action in imposing tariffs a system of import and export licensing was adopted to control the importation of flour and grain. The treaty restrictions terminated in 1925 and in October of that year Germany displaced its system of import and export licensing by a tariff system. During the years 1925-29 this system was only moderately protectionist but since the end of 1929 it has been drastic.

The grain measures adopted since 1929 have had the twofold object of aiding the domestic producers and attaining a self-sufficiency production basis. Some of these have had to do with import duties and restrictions, some with price stabilization, price fixing, and crop financing, some with milling and baking practices, and finally with virtual control of the marketing and milling industries.

GRAIN-HANDLING AND WHEAT-MILLING PRACTICES

The principal seaports are equipped with modern facilities for discharging grain from ocean-going vessels but the storage facilities are not so modern. Warehouses and barges supply most of the storage space for imported grain. Only a relatively small amount of storage space of the silo type is available for public use although most of the grain-storage space at the more important commercial mills is of the silo type.

Germany has a fine system of waterways, extending over a large portion of the country. The barges operating on the rivers and canals provide cheap transportation between points so situated as to take advantage of them. Most of the more important commercial mills are located on these waterways and use these barges freely. The barges usually have a carrying capacity ranging from 200 to 1,000 metric tons; most of them are between 200 and 300 metric tons capacity.

NUMBER AND CLASSIFICATION OF MILLS

There are many small grain mills most of which are of the windmill type (fig. 18). Practically all of them grind only feed or whole-meal flours because their equipment is usually crude or antiquated. A considerable number of larger mills have modern equipment and are capable of producing flour of the best grade. These mills produce by far the greater proportion of the flour used for human consumption.

The small mills have been gradually disappearing. According to published data there were 59,908 grain mills in Germany in 1875. By 1927-28, the latest year for which statistics are available, the number had decreased to 23,637. Of this latter number 17,649 had a daily grain-grinding capacity of less than 5 metric tons.¹³ Practically all of the mills of this capacity are antiquated and operate exclusively as feed mills. A great majority of them are windmills, which type is widely distributed, but is most numerous in the agricultural sections.

The modern-equipped mills are of larger size, are not so widely distributed, and are located at points where cheap transportation is available. The greatest milling center is at Mannheim on the Rhine and the second greatest at Hamburg. Formerly these seaport and river mills used foreign cereals almost exclusively, but owing to Government restrictions and regulations regarding the importation and milling of foreign grain this is no longer possible. Production at these mills has been materially reduced while production at inland mills has tended to increase.

Certain millers interviewed by the writer stated that the full-time milling capacity of Germany is 60 percent higher than actual domestic requirements.

¹³ Converted to barrels of wheat flour per 24 hours this capacity rating would be about 41.

Since the war a concentration movement has taken place in the milling industry which has resulted, on the one hand, in the consolidation of some of the milling enterprises into large milling companies, and, on the other hand, in the grouping of milling enterprises into cartels. The purpose of this movement was to reestablish the milling industry on a profitable basis for doing business through the regulation of production, prices, and delivery terms. The culmination of the movement has been affected by the recent action of the Government in putting the entire milling industry under strict Government regulation and control.

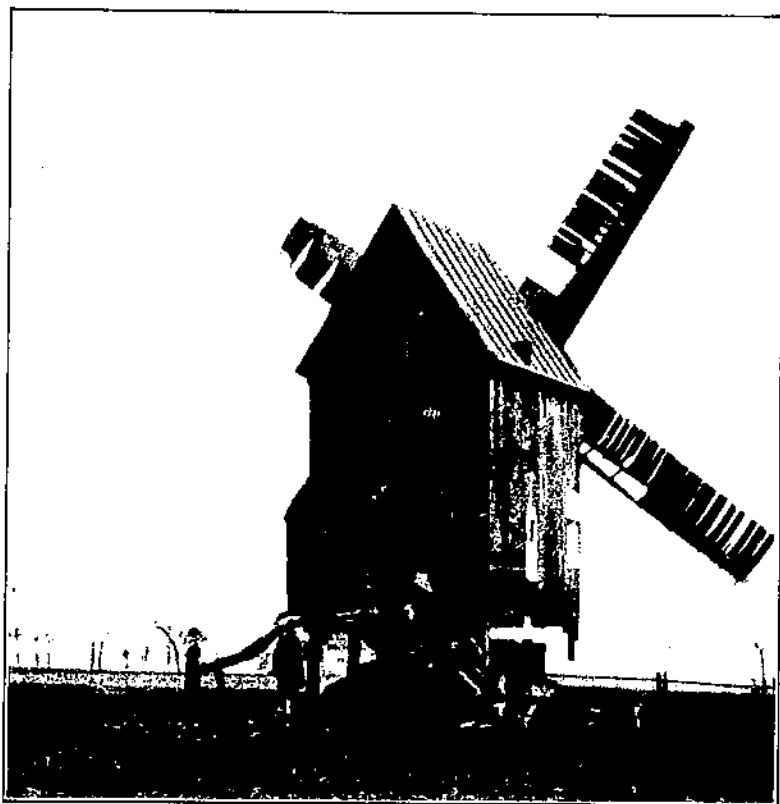


FIGURE 18.—This German windmill grinds wheat and rye. Thousands of this type of mill are still in use throughout central and eastern Europe, but most of the milling done in European countries is by the modern type of mill.

MILL PRODUCTION

Complete reliable statistics of German mill production are not available for any year more recent than 1927-28. Since that time many significant economic and political changes have taken place which undoubtedly have materially affected annual mill production. The 1927-28 statistics, therefore, cannot be considered as truly representative of present production but they are of historical value and should be useful to some extent in gauging present production. These data are presented in tables 26 and 27 and are discussed in the following paragraphs.

TABLE 26.—*Grain processed by German mills during the crop year 1927-28*

Product	Domestic	Foreign	Total	Product	Domestic	Foreign	Total
	1,000 short tons	1,000 short tons	1,000 short tons		1,000 short tons	1,000 short tons	1,000 short tons
Rye	1,514.8	597.4	5,112.2	Mixed grain	702.2	26.4	727.0
Wheat	2,091.8	2,912.3	5,604.1	Other agricultural products	3.6	11.1	17.7
Barley	477.3	1,086.9	1,564.2				
Oats	286.0	51.8	338.4	Total	8,766.3	5,215.9	13,922.2
Maize		528.0	528.0				

Compiled from [Deutsches] Statistisches Reichsamt (3, p. 141).

TABLE 27.—*Products produced by commercial mills, grist mills, and other mills, crop year 1927-28*

Mill product	Commercial mills	Grist mills	Other mills	Total
	Short tons	Short tons	Short tons	Short tons
Rye flour	1,980,833	991,409	88,815	3,051,057
Rye meal	219,027	146,165	18,739	383,931
Wheat flour	3,391,312	401,598	14,904	3,810,571
Soft wheat grit or semolina	97,443	551		97,991
Hard wheat grit or semolina	103,065	110		103,175
Wheat meal	4,079	5,181	331	9,591
Barley flour	4,409	7,385	119	11,901
Oat products	38,470	1,102		39,572
Corn flour	1,874	110	331	2,315
Flour made from mixed grain	7,826	22,597	411	30,864
Grouts and grits made from barley	43,320	1,433		44,753
Fodder meal	1,555,560	1,584,887	1,102	3,141,555
Feeding flour, bran, and other wastes	2,103,357	631,838	45,745	2,870,940
Other milling products	11,213	882	1,323	13,418
Total	9,651,824	3,785,218	171,958	13,622,600

Compiled from [Deutsches] Statistisches Reichsamt (3, p. 161).

Commercial mills processed 89 percent of the wheat in the crop year 1927-28 but only 64 of the rye, whereas grist mills and mills for other purposes processed 11 percent of the wheat and 36 of the rye. Commercial mills accounted for more than 99 percent of the foreign wheat processed and approximately 95 of foreign rye. According to data obtained from the same source as that of the tabular data referred to above, 62 percent of the wheat was processed by mills with a daily grinding capacity of 80 metric tons or more and 8 percent by mills of less than 5 metric tons capacity. On the other hand, of the total quantity of rye processed, only 19 percent was processed by mills with a daily grinding capacity of 80 metric tons or more and 22 percent by mills of less than 5 metric tons capacity.

MILLING EQUIPMENT AND TECHNIQUE

It has been pointed out that 62 percent of the wheat flour is produced by mills of 80 metric tons or more daily grain grinding capacity; (80 metric tons of wheat are equivalent to approximately 653 barrels of flour, conversion basis $4\frac{1}{2}$ bushels equal 1 barrel). These mills and some of even smaller capacity are of modern type and are well equipped. Most of them maintain chemical laboratories for mill-control and experimental purposes.

Some of the mill laboratories are crude and capable of making only the simplest tests; some are completely equipped, but as a general

rule mill laboratories are not so well equipped as those in the United States. The work done is similar except that more attention is devoted to the study of wheat-conditioning and flour-quality-improvement problems and less attention is given to routine chemical determinations. Such determinations are not so important as in United States milling, for the German baker is not much concerned about the chemical composition of the flour he buys but is in the habit of buying several qualities of flour and by cut-and-try methods of procedure producing a blend that is suitable for his requirements.

Routine testing for protein content is practiced only at a very few mills, but all mills make gluten tests. Ash content is considered important chiefly as a check on milling efficiency.

Grain-cleaning equipment at these mills includes all the ordinary types of machines and many special machines. Washers, conditioners, cockle cylinders, spiral separators, stoners, and oat separators are used in practically all mills that are accustomed to grinding foreign wheat. Many are equipped with the disk type of separators. Hard smut balls are most objectionable to German millers. They have little difficulty in removing other types of foreign matter but objection is made if the wheat contains any considerable percentage of foreign matter, no matter what type it is. Screenings separated from the wheat in the cleaning process as a general rule are ground and mixed with the bran and shorts. There is no law regulating the proportion but if it is high the resultant product does not find ready sale.

Foreign wheats are usually washed and conditioned separate from the domestic wheats, and these processes are usually so regulated that the moisture content of the grain when it leaves the conditioner is suitable for grinding. The moisture content at which wheat is ground ranges from $14\frac{1}{2}$ to 16 percent. Not all domestic wheats are washed.

Grinding operations in the larger mills usually include from 6 to 7 breaks, 2 to 4 sizings, and 8 to 15 reductions. In some of the mills stone buhrs are used for the reduction of certain tailings stocks. High grinding is practiced on the break rolls and close grinding on the reduction rolls. The extent of breaking surface used constitutes a relatively high proportion of the total grinding surface. In most mills after each reduction, disintegrators or pulverizers are used for breaking the flaky material resulting from the reduction operation. The linear grinding surface used by the bigger mills is about $2\frac{1}{4}$ inches per barrel of flour-grinding capacity. The bolting or sifting operations are done almost exclusively on sifters. Reels are seldom used except for rebolting or flour blending. Purifiers are considered important in the grading and purification of middlings stock for subsequent reduction into flour.

FLOUR EXTRACTIONS AND GRADES

In German mills flour extractions are generally long, ranging from 73 to 76 percent. The principal reason is that mill-offal prices are relatively low in comparison with wheat prices. Another reason is that the low-grade flours resulting from long extractions are useful for blending with rye flour. Three grades of flour are generally made. The first and best grade is a patent flour consisting of that portion of

the extraction up to 30 to 40 percent. This is used for pastries and luxury rolls, and to some extent as a household flour. The second grade is called Bäckermehl and corresponds to the bakers' or clear flour in American mills. It consists of the portion of the extraction that begins at 30 to 40 percent and ends at 65 to 68. It is used for rolls and bread for the cheaper class of trade and is sometimes mixed with patent. The third grade is called Brotmehl and is the tail end of the extraction. It is used for mixing with rye flours but not with patent grades of rye flour. Straight grade flours are made but usually only from 100-percent domestic-wheat mixtures. Besides the foregoing, certain special flours are produced; in several mills visited a very granular short patent flour was being made, said to be a special pastry flour.

One miller visited (who was grinding two mixtures, the one consisting of 75 percent of domestic, 21 percent of Manitoba, and 4 percent of Bahia Blanca wheat, and the other of 100 percent of domestic wheat) gave the following ash contents as representative of flours of various degrees of extraction milled at his mill.

Flours from foreign and domestic mixtures:	Ash content (basis 13.5 percent moisture) (percent)
Extraction beginning at 0 percent and ending at 30 percent...	0.41
Extraction beginning at 9 percent and ending at 68 percent...	.52
Extraction beginning at 20 percent and ending at 73 percent...	.59
Extraction beginning at 25 percent and ending at 75 percent...	.64
Extraction beginning at 30 percent and ending at 60 percent...	.72
Extraction beginning at 68 percent and ending at 72 percent...	1.14
Extraction beginning at 73 percent and ending at 76½ percent...	2.16

Flour from domestic wheat:

Extraction beginning at 0 percent and ending at 72 percent.....	.54
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The ash contents shown above for the better grades of flour are relatively high as compared with those of United States flours of similar degree of extraction. One explanation of this is that at least, until quite recently, ash content was not used as a marketing factor; consequently, German millers may not have been so particular about their separations in the production of their high-grade flours. Another plausible explanation, offered by a European milling engineer of wide experience, is that European wheats are generally of higher ash content than those grown in the newer parts of the world.

Different sections require different types and qualities of flour. Strong quality, high-grade flours are demanded in western Germany as far south as Baden-Baden and in some southern sections. These are the chief districts of the country in regard to per-capita consumption of wheat bread. Some cheaper grade flours are also required in these districts. In other parts of the country where rye breads are more generally used the demand for high-quality flours is not so pronounced. In Dresden a very strong gluten flour is demanded for the production of small round biscuits or buns of thin crust which breaks easily and is flaky like a dried gluten ball. This product was formerly a specialty of Vienna.

BLEACHING AND FLOUR-IMPROVEMENT PRACTICES

It is generally conceded that German wheats are deficient in some of the characteristics essential to the production of the quality of flour desired by the German baking trade. This deficiency can be

corrected by the addition of 30 to 40 percent of strong foreign wheats and in former years this procedure was generally followed. But recent Government milling regulations and import restrictions have made it impossible for the millers to mix the requisite proportion of foreign wheats in their milling mixture to give the desired quality to their flour product so they have had to seek other means that would assist them in the production of a satisfactory flour. Much experimenting has been done to discover some chemical treatment that will improve the quality of the domestic flour and a number of methods have been adopted which give beneficial results.

In some of these methods the flour is treated with a gas, in others chemical salts are added. In the gas treatments the Agene (nitrogen trichlorid) and electrical (nitrogen peroxide) methods are principally used. The principal chemical salts used are potassium bromate, ammonium persulphate, and benzol peroxide (Novadelox method). Approximately three-fourths of all the wheat flour milled is chemically treated; most of the rye flour is given a bleaching treatment and a small proportion of it is treated for quality improvement.

As the benefits to be derived from the treatment methods differ somewhat, many of the mills use two or more methods. The bromate treatment is supposed to toughen the gluten and is especially useful in connection with weak wheat; it is probably the most widely used. The ammonium persulphate method is supposed to liberate gas in the dough during baking and thereby increase loaf volume. This method is often used in combination with the bromate method. The electrical and benzol peroxide (Novadelox) methods are used chiefly for their bleaching effect. It is said that the Agene method (an American method) is well liked both for its bleaching and its improving effects.

Certain other methods or treatments are employed which are also intended to improve the quality of the flour. Some of these have to do with wheat conditioning and some with baking procedure, as in the use of malt extracts by bakers.

During the last few years certain of the improving methods have been attacked on the ground that they are harmful to the public health and some attempt has been made to get the Government to prohibit their use. No definite proof of their harmful effects has yet been presented and thus far the Government has taken no action. It is said that these attacks have been made chiefly by people who have an interest in a competing method which they hope will replace or supersede the method they attack.

WHEAT-MIXING PRACTICES

The German baking trade generally demands a flour of good gassing power, quick dough-development propensities, and elastic gluten quality, but it need not be of long fermentation tolerance. Domestic wheats have the requisite gassing and dough-developing properties but as they are deficient in other requirements it was formerly the practice, especially among the larger mills, to blend certain percentages of foreign wheats in their milling mixtures; almost any medium- or high-quality foreign wheat could be used to a certain extent. German milling mixtures usually contained from 40 to 70 percent of foreign wheat and in some instances consisted entirely of foreign wheat. In making up such mixtures, price was an important consideration.

Cheap foreign wheats of medium quality were used liberally and the high-quality, more expensive wheats were used sparingly; these wheats came from Canada, Union of Soviet Socialist Republics, United States, the Danube Basin, and Argentina. Canadian Manitoba wheats were considered to be the best in quality and the Russian and hard winter second best in quality. Danubian and Argentine wheats were used principally as "fillers" in mixtures in which some of the higher quality foreign wheats were present. No low-grade foreign wheats (which in some European countries are required in milling mixtures because of their high gassing properties and high diastatic activity) are needed in Germany.

Drastic restrictions imposed on the importation of foreign wheat since 1931 have made it necessary for German millers to use the highest quality obtainable for a high proportion of the foreign wheat. Some hard winter and the better types of Argentine wheats can be used in mixtures that contain 30 percent of foreign wheat, but the greater proportion of the foreign wheat used must be of a quality equal to No. 1 Manitoba. Actually, however, very few mills, in recent years, have been able to use as much as 30 percent of foreign wheat. The regulations and restrictions make the importing of grain so difficult and troublesome that most millers use the fewest types and the smallest quantity of foreign wheat that will meet their needs. This can be accomplished by using only the very highest quality wheats obtainable; No. 1 Manitoba Hard is being demanded almost to the exclusion of all other foreign wheats. In demanding the best wheat obtainable, price is of relatively little importance to the German miller.

A number of millers interviewed complained of the quality of the hard winter wheat purchased by the Government from the United States Federal Farm Board in 1931, although some millers reported that it was of satisfactory quality. The complaints made varied somewhat and included such expressions as "inferior in quality to previous purchases," "dirt," "old," and "unnatural odor." One complaint was that this wheat produced a reddish-colored flour.

One miller was of the opinion that United States hard winter wheats were worth 20 percent less than Manitoba wheats. Another said that, from the standpoint of effect on quality, 10 percent of Manitoba in their milling mixtures was equivalent to 15 of hard winter, whereas another thought that 30 percent of Manitoba was equivalent to 40 of hard winter. By some millers special types of Plate wheats are preferred to hard winter. United States northern spring wheats are rated by German millers as being among the world's best-quality wheats.

United States Amber Durum wheat is well liked for semolina, but some Plate and hard winter wheats also have been used for this purpose.

RYE-MILLING PRACTICES

Rye milling is as important as wheat milling and has been developed to the same high state of efficiency. Much of the equipment is the same in both industries, but certain types of equipment are necessary to the one and not to the other, and there are certain essential differences in processing or milling methods that make it impracticable to use the same mill for both purposes. In only a few instances is this attempted.

EQUIPMENT AND MILLING TECHNIQUE

When received at the mill the rye is given a rough cleaning over a receiving separator before it goes to the storage bins. The binning is done in accordance with some scheme of classification which usually takes into account only such factors as condition and natural weight. The chemical constituents of rye are not so important as in the case of wheat, although for certain purposes some distinction is made regarding quality characteristics. For example, Plato rye is considered superior to domestic and Canadian rye for the milling of coarse rye meal (called Roggenschrot) used in Schwarzbrot, because of its low moisture and starch contents. Canadian rye has a low moisture content but not a low starch content. The moisture content of these two ryes is generally about 13 percent, whereas that of domestic rye is from 16 to 19 percent. In making up his grist for milling, the rye miller makes some attempt to maintain a uniform mixture, considering condition and natural weight chiefly.

In milling by means of rolls it is often the practice to flatten the kernels before beginning the breaking. No separation of stock is made after this operation, but the flattened kernels pass directly to the first break rolls. It is considered particularly important that the first break rolls have a relatively great length of grinding surface so as to produce a high proportion of flour at this point in the process. About seven breaks are used in the larger mills. The reduction operations, usually done on smooth rolls, are not so numerous as in the case of wheat milling. In some of the mills stone buhrs are used for the coarse middlings reductions. Pulverizers or disintegrators for breaking up the flaky material are frequently used after each reduction operation before the reduced stock goes to the sifter.

No purifiers are used in rye milling. As a general rule, the grading of the ground material for subsequent grinding and the separation of the flour are done by means of sifters of the plan-sifter type. Reels are sometimes used at the end of the process. Bleaching is practiced in nearly all of the rye mills and in a few chemicals are added for flour quality improvement.

RYE FLOUR GRADES AND EXTRACTIONS

Before the World War the rye flours marketed for domestic use were of three so-called extractions—60, 65, and 70 percent. At that time the 70-percent-extraction flour was in greatest and the 60-percent in least demand. Since the war there has been a tendency toward whiter rye flours of better quality, so that the 60-percent-extraction grade is now in greatest demand, and another grade has made its appearance—a patent grade of 35 to 45 percent extraction. The demand for this grade is not great but the fact that it is being produced even in small quantities has some significance. The tendency toward the better grades of flour here shown in the case of the domestic trade also holds true for the export trade except that fewer grades are dealt in.

The grades mentioned do not mean exactly what their names imply. The extraction percentages indicated for them are in reality only designations for certain qualities generally accepted as being associated with such extractions and may or may not represent the true extraction percentages. In producing these grades the miller strives to

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make as high a proportion of the desired quality of flour as he possibly can, regardless of the extraction percentage of the grade; consequently, the actual extraction percentage of the particular grade produced is in many instances somewhat higher than the indicated grade percentage. Moreover, the miller does not limit his extraction to the quality of any of the so-called grades, but produces as much flour (extractions are usually from 70 to 72 percent) as is consistent with good milling practice, and if any portion of the resultant product is of a quality unsuitable for the particular grade of flour desired, such portion is separated as a low-grade flour.

Some of the low-grade rye flours are sold to bakers for use in their dark rye breads, and some the miller blends either with his shorter extraction flours to make the so-called long-extraction flours or with his dark and whole-grain rye flours of the type used for making black bread and pumpernickel. The quantity that can be used in this way is small and is chiefly dependent on its quality.

It should be borne in mind that the extraction percentage obtained is to some extent dependent on the quality and condition of the rye used and on the individual efficiency of the miller.

Prior to the war rye flour was milled to an average extraction of approximately 70 percent. Owing to improved milling technique, rye-flour extractions since the war (except for the period 1931-32, in which Government regulations prescribed the percentage of extraction) have increased from 1 to 2 percent. Coincident with this increase in extraction percentage there has been a demand tendency toward rye flour of better quality.

Formerly rye flour was marketed on an extraction-percentage basis, but no specifications were prescribed whereby the buyer could be assured that he was getting flour of the designated extraction percentage. Beginning September 1, 1933, official specifications were put into effect in Berlin which prescribed the ash-content limitations for the various market types of rye flour.

BAKING PRACTICES

PRODUCTION AND DISTRIBUTION

Bread baking is done mostly in commercial shops and bakeries. As the city housewife seldom, if ever, bakes her own bread, the home baking is confined almost exclusively to farm families and even there it is not so general as might be expected because in most sections farmers live in villages and can buy bread conveniently and cheaply from the village bake shop.

Other use of flour in the homes is generally limited to the making of gravies, special dishes, and baked goods that must be served hot or are not obtainable from the commercial bakeries. Cake baking is not very highly developed among German housewives and pies are unknown. Tarts and other forms of pastries are made, but sparingly, for they are luxuries that only a comparatively few can afford.

Many of the farm villages have community ovens for baking bread which the farmer women use in turn. Each housewife bakes about once a month using a special yeast culture which is preserved in some form of leaven from one baking to the next. The loaves so

baked vary from 2 to 5 kg in size. These loaves are baked very slowly for from $2\frac{1}{2}$ to 3 hours.

Both the modern factory type and the shop type are found among the commercial bakeries, the factory type in the cities, and the shop type everywhere, in villages and in all sections of the cities.

The factory type employs the modern machine methods of production but in the shop type the machinery is limited ordinarily to a machine mixer or kneader and to a divider for roll making. In many of these shops even these operations are done by hand.

The shop bakery is usually more or less a family affair. The operator and his family live on the premises and all help in the work. Some delivering is done, but no soliciting. It is an established custom among the middle and upper classes and among many people of the lower class to have fresh wheat flour rolls for breakfast every morning except Sunday. In the larger cities these rolls are delivered by the baker or his helpers. These deliveries are usually made by boys or girls on bicycle or afoot. Sometimes a small fee of 10 pfennigs is charged per week for delivery service.

For distribution purposes the large or factory type of bakery operates a chain of sales shops throughout the territory it serves. Trucks or horse-drawn wagons are used to carry the baked goods from the bakery to these sales shops, which, from the sales and delivery standpoint, are operated like the shop type of bakery. The large bakeries also supply many of the small bakeries with the staple types of baked goods, particularly the ordinary breads since the small baker frequently finds it more profitable to buy them from the big bakeries than to make them himself. Moreover, by so doing he can specialize on fancy or special products or on those products that must be delivered to the consumer fresh from the oven, like the breakfast roll, which, owing to a regulation or law prohibiting the operation of bakeries before 5 a. m., the large bakery is unable to produce in time for distribution for breakfast use except in its immediate neighborhood.

Bread and other bakery products except package goods are seldom handled by grocery stores.

A few of the large bakeries are owned and operated by flour-milling companies and a few bakeries operate mills to produce their own flour, but in most cases bakeries are not connected with the milling industry.

According to statements made by tradespeople, the shop type of bakery produces more than 80 percent of the commercial breads used and approximately 95 percent of the commercial wheat-flour products. Breakfast rolls constitute the major portion of the wheat-flour products.

CUSTOM BAKING

Custom baking is an interesting practice. In some of the agricultural sections the farmer delivers his grist of grain to the baker who weighs it and credits him with a certain quantity of bread to be taken from day to day as needed. In eastern Germany a baker was allowing the farmer 35 kg of bread for 50 kg of grain; this rate applied only to the cheapest types of bread. In the villages of certain sections housewives make their own bread dough and sometimes puddings and other preparations or mixtures and have them baked by the village baker, but this is not a general practice.

COMMERCIAL BAKING METHODS

Automatic electric mixers are used for preparing the doughs in the large bakeries and in many of the small ones. In the afternoon preceding the baking, the yeast and salt are placed in separate sections of the mixing bowl which also serves as a fermentation trough. At that time the flour is weighed out and placed in a container above the bowl and the required quantity of water for the mixing is placed in another container above the mixing bowl. Between 2 and 4 a. m. the flour and water are automatically dumped into the mixing bowl and the mixer starts operating; in 5 minutes the mixing automatically stops; in another hour the mixer again automatically starts and mixes for 5 minutes. These operations are controlled by an electric device attached to a clock. At 5 a. m. when the baker arrives, the dough needs only handling and proofing, after which it is ready for the oven. Only the slow-speed bowl-type of mixer is used.

The straight-dough method of baking is generally employed where electric mixers are used. The sponge-and-dough method is not practicable with these mixers especially during the summer. The length of time for dough fermentation is usually 2 hours or less. The doughs for the hearth-baked breads are generally proofed in cork or paper-composition bowls. Most breads are of the hearth-loaf type. Some breads are paper wrapped. The common or ordinary breads contain only flour, water, salt, a pinch of sugar, and yeast. Milk and fats are used only in the fancy or special breads and the better types of rolls.

In shops that do not employ the electric mixer, both the straight-dough and the sponge-and-dough methods are used. The latter best suits the conditions of the small baker, particularly in making the breakfast rolls, as it is supposed to produce rolls of better flavor. It also requires less yeast but probably the chief reason is that the sponge can be set the night before, so that the doughs can be prepared and handled more quickly in the morning. The straight-dough method is generally used in making bread for meeting unexpected demands and for orders that need not be filled the first thing in the morning.

QUALITY CONSIDERATIONS

The water-absorption capacity of a flour, although important, is given little attention by the average baker who concerns himself about it only when there is a marked change in capacity from the ordinary. Flour quality is judged chiefly on the basis of its ability to produce a loaf of good exterior and interior appearance and of good volume. The crumb should be of light texture and have fairly small pores of uniform size and the crust should be brown in color and rather hard and crisp. Any expansion of the dough that takes place in the oven must be in a vertical rather than a horizontal direction. Flours are wanted that can produce dough of good stability and gas-producing power and that are suitable for the short-fermentation method used in baking.

The desirable rye-bread characteristics are: Crust—dark brown to almost black in color and fairly smooth without breaks or gashes; shape—rounded, neither flat nor high; texture—somewhat solid with very small pores.

BAKERY PRODUCTS

The ordinary breads (fig. 19) used are of five general types: (1) Rye bread made from 100-percent or nearly 100-percent rye flour, (2) mixed rye and wheat bread, (3) coarse rye bread made from coarse rye meal of 90- to 100-percent extraction, (4) wheat bread (rolls and loaf bread) made from wheat flour, and (5) health breads made from whole-wheat flour or meal. Rye bread is used principally in some sections; in other sections mixed rye-and-wheat bread is the chief type. In the eastern Provinces—East Prussia, Brandenburg, Grenzmark, Lower Silesia, and Upper Silesia—and in Saxony, rye breads or those containing nearly 100-percent rye predominate. Pomerania is the only Province in the eastern tier in which mixed rye-and-wheat breads are preferred and even there they are of secondary importance. In the western part of the country the Provinces of Hanover and Schleswig-Holstein prefer rye breads containing nearly 100-percent rye flour, but this preference is not pronounced. In the three far-western Provinces—Hesse-Nassau, Westphalia, and Rhineland—



FIGURE 19.—Various bread types found in Germany.

there is a distinct preference for breads containing a relatively high percentage of wheat flour.

The consumption of coarse rye bread is second in importance.

Wheat-flour breads of the loaf type are used chiefly at Sunday breakfast by the middle and upper classes as a substitute for fresh rolls, which are unobtainable on that morning. They are generally classed as a luxury.

On the other hand, wheat-flour bread in the form of rolls is fairly important. Throughout Germany rolls constitute an important part of the breakfast among all classes except farmers and the poorest paid laboring people.

Whole-wheat breads are seldom used, except those given special processing or containing special ingredients, supposed to have a bene-

ficial effect on the consumers' health, and therefore classed as health breads. They are relatively high in price and are in the luxury class.

Within each of the bread types referred to there are a number of kinds differing as to form or composition. A partial description of the principal varieties follows:

Rye-flour breads are of three general qualities, the "fine" bread made from patent rye flour, landbrot (country bread) made from a 70-percent-extraction rye flour, and Kommissbrot made from an 82-percent-extraction rye flour. These vary in color from a light grey to a dark grey or brown. The first two are the most common types and generally contain some wheat flour varying according to consumer requirements in different districts from 0 to 40 percent. In western and central Germany they are usually of oblong shape, but in eastern Germany they are of flat round shape. The most popular size of loaf for these breads is of 1,250 g weight.

The whole-meal or rye breads are the so-called "Schwarzbrote" or black breads and pumpernickel. They are made from rye flour or meal of 90- to 100-percent extraction. The so-called Schwarzbrot is usually made from a rye meal from which the coarse bran has been removed with the addition, sometimes, of a small percentage of whole-wheat meal. Pumpernickel is made from 100-percent rye meal.

Wheat-flour loaf breads are generally worked with milk, fat, and sugar, and are baked as both pan and hearth breads. Because they are in the luxury class they are usually made in the small sizes of 250 to 500 g. These breads are generally not quite so light in texture as United States breads, but in other respects are similar. Most of the wheat bread seen by the writer was of a crumbly character denoting the use either of a weak flour or of too much fat. The decrease in the use of foreign wheats in recent years may be responsible for this characteristic because it is generally conceded by German bakers that domestic wheats are too weak for the production of good bread.

The most simple shape of breakfast rolls is the smooth round or oval roll formed mostly in doubles; it is common all over Germany. A more popular shape is the pressed or cut roll which has a greater area of the desired crust surface; it is made with a shorter dough. For both types glutenous flours are used, which are favorable to the formation of a smooth crust and a full volume. Some milk is generally used. Other shapes and types of rolls, are not so widely used, are generally of more complicated shape or contain ingredients that make them more expensive. Some are made from mixed wheat-and-rye flour, some are sprinkled with caraway seeds, poppy seeds, or salt, and some contain a high proportion of fat.

Several other kinds of bread are made. Whole wheat breads, usually of the so-called "health" type, vary considerably in composition. Zwieback and rusks are made in large quantity; their use is widespread, and their combined production is probably greater than that of wheat-flour bread. The large bakeries are the chief producers.

Knäkebrot is a crispy, hard-water type of cracker and is widely used. It is produced in three qualities or grades and is made from whole rye meal without yeast.

The cakes and pastries are mild in richness and of inferior quality compared with United States cakes and pastries. Except in the case of Baumkuchen, which is the cake par excellence of Germany,

the cakes are usually of simple form and composition. Short-bread and confection types of tea biscuits are made in limited quantities.

Pretzels are widely used. Numerous kinds of pretzels, made of wheat flour, are sold ranging from soft to hard and stinty; some have salt and some do not; some are sweet; some are made with yeast, and some are not. One German recipe book lists 176 sorts. Preference is given to a certain type according to district. Pretzels are most popular in Bavaria. Except for a few of the most popular sorts, pretzel making is a side line of the small bakery shop and is not a specialized industry. In fact, the pretzel is the special insignia of the baking industry and over nearly every baking establishment in the country is seen a large gilded pretzel.

BREAD-CONSUMPTION TRENDS

Germans are heavy eaters and they have always shown a distinct preference for rye breads, but the writer believes that in future years this preference will become less pronounced. There was a tendency in this direction prior to 1928, but since then, owing to reduced purchasing power of the consumer and to the lowered bread quality resulting from the drastic restrictions placed on the importation and use of foreign wheat, there has been a slight tendency in the reverse direction. But these influences are of a temporary nature and the result of an abnormal situation. When the depression is over and these influences are removed, the tendency will again be toward an increased use of wheat for human food and a decreased use of rye.

The change in living habits that is taking place because of the adoption of machine methods of production is necessitating some change in dietary habits. Wheat breads are more easily digested than the heavy rye breads and with the tendency toward less manual labor and more sedentary occupations people are likely to turn to wheat breads. That has already taken place to some extent in the industrial sections as evidenced by the fact that the breads used there generally have a higher content of wheat flour than those used in the agricultural sections. The younger generation of Germans tend to use less beer, and beer and rye bread go together.

DIETARY HABITS

In German cities for the middle and upper classes the first meal of the day is served at about 8 a. m. and consists of coffee and rolls with butter and jam or honey. Only in a very few cases are eggs or cold meat served and many people have only a cup of coffee or tea. More importance is attached to the so-called second breakfast (*zweite Frühstück*), served between 9 and 10 a. m. This is a very popular meal both with people staying at home and with workers. It consists of bread, butter, and cold meat or sausages. In many offices accommodations for the making of the coffee are provided.

The principal meal of the day is served at about 1 p. m. and consists of soup, meat, vegetables, and potatoes. A dessert is not always included. No breads are served. This is the type of meal customarily eaten by people staying at home and by those working people who can afford to go to a restaurant in the middle of the day. Workers who cannot go home or who are not fortunate enough to be able to go to a restaurant at this time of the day eat a meal which they carry

from home, consisting of sandwiches, to which—according to the taste and means—salads, fruit, and a cup of tea or coffee are added.

At 4 p. m. coffee is served again with bread, butter, and jam or cake. This again is a popular meal, corresponding to the English 5-o'clock tea, and is a regular custom, especially for people staying at home. This habit is so firmly established that, for instance, in the Berlin district people who are going for a country trip but cannot afford to buy coffee at a restaurant carry along ground coffee for making their own drink; a great number of restaurants in the vicinity of Berlin, chiefly those patronized by the middle and lower-middle classes, provide boiling water and coffeepots for a small fee. This custom, which before the World War prevailed only among people of small income has spread considerably among the better-to-do classes, in Berlin and adjacent districts, so that a sign is displayed in many country restaurants reading "Hier können Familien Kaffee kochen" (in this place families can make their own coffee).

Drinking at mealtime varies greatly. For instance, in the wine-growing districts of south Germany coffee does not play the same part as in the north of Germany, its place being taken by wine which is cheap and which usually forms a part of the midday and evening meals. In Bavaria, beer plays an important part at these meals. The term "coffee" does not always refer to a beverage made from coffee beans, for the term is also applied to a beverage made from roasted barley which is popular with country people, the working classes, and poorer middle classes.

Supper is taken between 7 and 8 p. m. and in northern Germany consists of bread, butter, and so-called Aufschnitt (mixture of cold meat, ham, and sausages), and either beer, coffee, or tea. In western and southern Germany the meal differs from that in northern Germany in that a hot dish is served instead of the Aufschnitt.

In the country dietary habits differ considerably from those in cities. Country people eat their first meal as early as 5 a. m. and for farm workers it consists of coffee and rye bread with lard or jam, butter being used only to a small extent. A second breakfast is served between 9 and 10 a. m. and consists of rye bread with bacon, sausages, or cheese, and coffee or a light beer. In summer this meal is eaten in the fields. The chief meal is served from about 12 m. to 12:30 p. m. and is generally a one-dish meal of potatoes, meat (generally salt meat), and vegetables or a thick soup. At about 4 p. m. coffee again is served with bread and lard or jam. Supper is served at 7 p. m. and consists either of a soup with rye bread or of potatoes in their jackets with herring, eggs, or a similar dish.

Bread is not served, as a rule, with hot meals except in Bavaria, where it is an important item. In pre-war times it was customary for restaurants to serve their customers, free of charge, as much bread as they wished with their meals or beer. This custom no longer prevails; a small fee is charged for each roll or slice of bread.

HUNGARY

Hungary has an area of 35,654 square miles (is smaller than the State of Indiana) and a population of slightly less than 9,000,000. It is predominantly a wheat-bread consuming country and one of the few wheat surplus-producing countries of Europe. At one time Buda-

pest, the capital, was the world's leading flour-milling center. The modern system of milling originated in this country and for a long time the mills of Hungary led the world in milling science and technique. During this period of leadership, Hungarian-milled flour commanded the top price in the markets of the world.

BREAD-GRAIN PRODUCTION

During the pre-war period, 1909-13, annual wheat production in Hungary of the present-day boundaries averaged 71,493,000 bushels (table 28). In recent years production has been somewhat higher, averaging for the 1924-28 period 74,859,000 bushels and for the 1929-33 period 78,539,000 bushels, this latter figure representing an increase of nearly 10 percent over pre-war production.

TABLE 28.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Hungary, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ²	Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:													
1909-13			3,712				71,493	19.3					
1924-28	3,731	48	3,779	74,016	813	74,859	19.8	212	2	11,182	9,200	54,691	6.5
1929-33	3,870	55	3,925	77,737	802	78,539	20.0	1	1	14,229	6,077	57,635	6.6
Annual:													
1929	3,648	61	3,708	74,071	914	74,985	20.2	1	2	17,718	13,607		
1930	4,121	66	4,187	83,336	1,003	84,339	20.1	1	1	9,090	9,335		
1931	3,952	59	4,011	71,849	701	72,550	18.5	(1)	1	13,053	5,011		
1932	3,717	46	3,763	63,935	528	64,463	17.0	2	(1)	5,123	1,887		
1933	3,879	45	3,924	65,494	862	66,356	21.6	0	0	26,160	3,155		
1934	3,729	69	3,798	63,843	981	64,824	17.1	(1)	0	10,605	1,834		

¹ Year beginning July 1.

² Converted to grain on basis of 4.5 bushels per barrel.

³ Stocks at beginning and end of periods are disregarded.

⁴ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 29.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Hungary, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	1,608	31,377	19.5				
1924-28	1,652	28,199	17.1	3	6,410	21,792	2.6
1929-33	1,590	29,891	18.8	(1)	4,201	25,690	2.9
Annual:							
1929	1,628	31,423	19.4	(1)	5,942		
1930	1,611	28,406	17.6	(1)	3,319		
1931	1,546	21,672	14.0	(1)	2,712		
1932	1,533	30,301	19.5	(1)	3,003		
1933	1,677	37,651	22.5	0	6,481		
1934	1,540	24,380	15.8	0	1,295		

¹ Year beginning July 1; flour included, converted on the basis of 6 bushels per barrel.

² Stocks at beginning and end of periods are disregarded.

³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Annual rye production during the pre-war period, 1909-13, averaged 31,377,000 bushels (table 29)—less than one-half the production of wheat. Unlike wheat, rye production in recent years has been lower than in pre-war times, averaging for the 1924-28 period 28,199,000 bushels and for the 1929-33 period 29,891,000 bushels.

Because of an unusually severe drought during the spring and summer of 1934, both the wheat and rye crops of that year were among the lowest in recent years.

FOREIGN TRADE IN WHEAT AND RYE

Hungary's foreign trade in wheat and rye is almost solely as exports. Normally this country produces a surplus over domestic requirements of about 20,000,000 bushels of wheat and from 4,000,000 to 6,000,000 bushels of rye. This surplus grain is usually exported to other European countries, principally Austria, Czechoslovakia, Italy, Switzerland, and Germany. Formerly the major portion of these exports was of flour, but in recent years the greater part has been of grain. The milling capacity is still great enough to grind the exportable wheat and rye surpluses into flour, but the import flour market has been killed in most countries by discriminatory duties and import restrictions on flour as against grain. Tables 30 and 31 give statistical data on wheat and flour exports.

TABLE 30.—Exports of wheat from Hungary by principal countries of destination, 1925-33

Destination	1925	1926	1927	1928	1929	1930	1931	1932	1933
	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Austria	3,880	6,720	4,378	3,770	5,781	4,422	5,869	2,570	4,409
Czechoslovakia	2,411	4,181	5,462	4,182	4,160	4,353	83	282	1,037
Rumania	224	52	1	47	450	2	62	()	..
Yugoslavia	215	2	11	131	3	1	55	()	..
Germany	363	581	108	5	1,200	361	66	2,410	..
Switzerland	121	81	13	186	1,710	310	1,692	21	1,811
Italy	683	2,915	431	237	2,081	3,335	339	1	1,657
Belgium	..	..	..	..	219	..	602	()	216
France	..	..	..	..	65	()	1,525	..	287
Great Britain	..	..	..	..	..	..	2,591	..	805
Netherlands	..	..	..	..	316	..	212	..	..
Greece	2	..	..	18	569	45	621	..	..
Turkey	0	0	0	588	773	73	0	0	..
Poland	192	203	1,033	1,251	121	56	0	0	..
Other countries	0	0	0	19	91	1	79	1	6,321
Total	8,019	11,831	11,417	10,149	17,857	12,791	13,259	5,288	16,563

Less than 500 bushels.

Compiled from official sources.

TABLE 31.—Exports of wheat flour from Hungary in terms of grain, by principal countries of destination, 1925-33¹

Destination	1925	1926	1927	1928	1929	1930	1931	1932	1933
	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Austria	3,325	4,792	5,571	6,751	8,666	7,539	4,508	2,356	2,113
Czechoslovakia	4,411	2,221	2,078	2,736	2,622	3,185	2	370	86
Germany	112	216	107	46	201	130	30		
Switzerland	11	550	416	428	521	359	876	121	1
Italy	73	268	21	45	211	21	282	24	151
Poland	2,017		61		18	5			
Great Britain	12	13	37	36	657	123	315	181	100
Rumania	99					(?)			
Turkey				1	6		(?)		
Yugoslavia	165	5		139	1	5			
Norway			23	12	17	15	40	36	65
Other countries	21	200	33	26	533	228	181	5	169
Total	10,452	8,351	8,353	10,220	13,186	11,820	6,351	3,493	2,697

¹ Includes semolina and red dog flour, converted to grain on the basis of 11 1/2 bushels equal 1 barrel of flour.² Less than 500 bushels.

Compiled from official sources.

CHARACTERISTICS AND QUALITY OF HUNGARIAN WHEATS

In the nineteenth century before the hard wheats of North America had become known on the markets of the world, Hungarian wheats were preeminent in quality, but owing to the superior quality of North American wheats Hungarian wheats no longer hold first place. The introduction during the World War of high-yielding varieties that are of poor baking quality also had a damaging effect on their reputation. Some of these wheats are still being grown.

Hungarian wheats are predominantly red in color and of winter habit. Less than 2 percent is spring-sown. Some wheat of the durum species is produced, but a great preponderance of the production is of the common species (*Triticum vulgare*). In texture or hardness of kernel, the common wheats range from soft to hard with the bulk of them either of soft or semihard texture. The soft wheats resemble the soft red winter wheats of the eastern United States. Some of the wheats of hard texture resemble the United States hard red spring type and some the United States hard red winter type.

The moisture content is relatively low compared with that of the wheats of western Europe. Especially is this true at harvest time. According to information obtained from the Cereal and Flour Research Institute at Budapest, the usual moisture content at harvest time is 10 to 11 percent. After the fall rains begin, it rises to 12 to 14 percent.

The commercial wheats frequently contain an appreciable percentage of foreign matter. Rye, vetch, and corn cockle are the principal kinds. Smut balls and nematode galls *Tylenchus tritici* (Steinbuch) Bastian are of common occurrence, but are not present to any great extent.

The principal wheat-producing area of Hungary is a black-soil plain which usually is hot and relatively dry during the ripening and harvesting seasons. This wheat belt is somewhat similar to the great wheat-production areas of Kansas and Nebraska. The wheats of best quality are produced in the driest and hottest section of this plain. These high-quality wheats are much sought by the domestic millers, who generally are willing to pay a premium for them.

At the town of Oroshaza, reputed to be the producing center for the wheats of best quality, a number of the larger milling concerns maintain buying agencies during the marketing season. To this town farmers from the surrounding country bring their wheat in wagons and "stand on market" in much the same manner as do vegetable and meat men who market their products in open market places. In the principal wheat-marketing season the main street of the town on market days is lined with farmers' wagons containing wheat on display for sale (fig. 20). Buyers make the rounds of these wagons examining the various lots of wheat offered and bidding on those they wish to buy. The test weight of the wheat and its quality as indicated by appearance are taken into account by the buyer when bidding. If the bids received by the farmer are not satisfactory, he may haul his grain back home to be marketed some other day when he hopes a more favorable price will be offered. The extra time and



FIGURE 20.--A wheat-market scene in Oroshaza. Most farmers of Hungary market their wheat in much the same way the farmers in the United States market their vegetables.

labor involved in taking wheat to market a second time is given little consideration by the farmer because it is usually done at the season of the year when work is slack and when he can receive no other compensation for his time or for that of his horses.

In about 1928 the Government began to take definite action to effect an improvement in quality. Through the three Government plant-breeding stations located in the agricultural sections, seven improved varieties, adapted to local conditions were at first selected as the medium through which the Government proposed to improve the quality of the domestic wheat crop; later the number was reduced to four. Seed from the selected varieties were multiplied in such a way that in 1931, approximately 10,000 bushels of high-grade seed wheat was available.¹¹ The Government, in the fall of 1931, distrib-

¹¹ UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS. ESTABLISHMENT OF MINIMUM PRICES OF WHEAT IN HUNGARY . . . U. S. Dept. Agr., Bur. Agr. Econ., Belgrade Off. Spec. Rept. 1703, 10 pp. December 11, 1931. [Typewritten.]

uted this seed wheat among large estate operators for further multiplication for seed purposes. In the fall of 1932 approximately 367,000 bushels of improved wheat were distributed to farmers and in 1933 approximately 550,000 bushels. As the result of these distributions and the Government's efforts toward variety improvement, about one-third of the entire acreage of the country was planted with the improved wheat in the fall of 1933. Government officials expect that by 1936 practically the entire wheat production of Hungary will be of these selected varieties.

All of the selected varieties are of red color. Some of them are of the soft red winter type; the others are either of the hard red winter or hard red spring types. Probably the most important of the improved varieties from the standpoint of quality and acreage seeded is Bankuti No. 1201, which is a cross between a wheat of the original Hungarian type and Marquis. It somewhat resembles Marquis wheat in physical appearance.

As evidence of the improvement already made in the commercial wheats, it has been said that¹⁵ whereas the quality of Hungarian export wheat was often criticized before 1933 foreign buyers repeatedly gave testimonials of their satisfaction during the 1933 and 1934 crop years. This improvement in the quality of Hungarian commercial wheat increases its competitive potentiality with American wheat in foreign markets. Moreover, if, as is reported, the newly introduced varieties are more productive than those they are replacing, the decrease in acreage that has occurred in recent years should be partly offset by the increase in yield.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

Need for governmental assistance to the wheat producer was felt in the nineteenth century when the competition of United States wheats, on both the domestic and the world markets, forced the price of Hungarian wheats below the cost of production. To correct this situation, a 6-gold-crown per quintal (33.1 cents per bushel) duty was placed on imports of wheat into Austria-Hungary. Shortly after the beginning of the twentieth century this duty proved to be ineffective protection against United States competition. In consequence, farmers requested that the import duty be increased to 9 gold crowns (49.6 cents per bushel). This request was granted and the higher rate became valid in March 1906. Apparently this gave the desired protection, for available cost-of-production data¹⁶ show profitable returns to the wheat growers for the years from 1906 to the outbreak of the World War.

Because of the separation of Austria and other territory from Hungary at the conclusion of the World War, the Hungary of today has a somewhat different problem in respect to the disposal of the wheat crop than formerly. The great shrinkage in the domestic market resulting from these separations has greatly increased the importance to its agricultural industry of the export trade in wheat

¹⁵ UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS. RELIEF EXTENDED BY THE HUNGARIAN GOVERNMENT TO BREAD GRAIN PRODUCERS FROM 1930 TO 1934. . . U. S. Dept. Agr., Bur. Agr. Econ., Belgrade Off. Spec. Rept. 170, 7 pp. May 18, 1934. [Typewritten.]

¹⁶ UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS. . . COST OF PRODUCTION AND PRICE OF WHEAT DURING THE LAST ONE HUNDRED YEARS IN HUNGARY. . . U. S. Dept. Agr., Bur. Agr. Econ. Belgrade Off. Spec. Rept. 197, 23 pp., Dec. 31, 1934. [Typewritten.]

and flour. The Hungarian farmer's concern now is the competition of foreign grain in the world market rather than on the domestic market, for the latter has been taken care of by the virtual prohibition of importations of foreign wheat and flour.

Since the war the Government has intervened in the grain trade to improve the farmer's condition. It has exercised various monopolistic powers through the medium of certain permanent institutions set up for the purpose of regulating internal and external trade; and with these as a nucleus it has resorted to a number of measures on the side of control technique. Most striking among these is the system of the "grain ticket" adopted July 15, 1930, and operated for 4 years.

Under this system a prospective purchaser of wheat or rye, or their mixture, both imported and domestic, had to obtain a permit in the form of a grain ticket from the local municipal authorities at a cost fixed by decree each crop year. The proceeds from the sale of these tickets went into a central fund known as the cereals valorization fund. Included with the ticket was a coupon to be detached and given to the producer so that in addition to the selling price of the grain he received a coupon to be redeemed by the Government. As the grain moved from one buyer to another, each was obliged to purchase the accompanying ticket, minus the coupon, from the preceding owner. In the case of exports of grain and flour the Government took up these tickets and reimbursed the exporter in order that Hungarian grain and flour could compete in the world market. This in effect constituted a bounty on exports. In the case of milling for domestic consumption, the miller received no reimbursement. Thus, in this instance the ticket system was in effect a processing tax, which tax was paid through the medium of the Government-issued coupon-bearing ticket purchased by the original buyer of the grain. The redemption value of the coupon given to the farmer constituted a premium above the world market price for wheat.

By a governmental decree effective July 1, 1934, the grain-ticket system was abolished and the premium previously received by producers was replaced by other farm-aid measures consisting of (1) a refund of land tax, (2) a reduction in the amount of obligatory public work to be done by farmers, (3) a reduction of the railway freight rates on certain agrarian products, and (4) the promotion of the sale of farm products.

Other measures that have been put into effect for the wheat farmers' assistance in recent years include the following: For a short time premiums were paid on the exportation of wheat or its equivalent in flour, amounting to as much as 3.5 pengös per quintal (17 cents per bushel at par of exchange). A duty of 35 cents per bushel, plus a 3-percent tax, was placed on wheat imports, and on imports of wheat flour a duty of about \$2.35 per barrel, plus the turn-over tax of 3 percent, was placed. Special trade agreements were made with several western European countries which have secured for Hungarian wheat preferential access to their markets.

MILLING PRACTICES

After originating the modern process of milling, Hungarian millers for a long time maintained world leadership in milling science. During this period of leadership, Hungarian flour was supposed to

be the best in the world. It was sold at top price in all the important flour-import markets. But during recent years Hungarian mills have lost a goodly share of their prestige mainly for two reasons: The milling technique employed in certain other countries has advanced to a plane above that in Hungary, and wheats superior in quality to Hungarian wheats are being produced in abundance in certain other parts of the world. This loss of prestige, together with the discriminatory measures adopted in recent years by foreign countries against flour imports, has resulted in a great decline in the exports of flour from Hungary. Because of this shrinkage in trade, a number of the largest mills have been forced out of business. Some have been converted into textile mills.

The Hungarian miller is averse to permitting strangers in his mill and to discussing his milling technique. Judging from what the author could see from the few mills to which he was able to gain entrance, this might be due to the miller's wish to conceal the lack of modernization of his plant rather than to any special or peculiar milling practice which he wished to keep secret. Most of the mills and equipment are old, for the condition of the milling industry in recent years has prevented the miller from making the changes in equipment and operating technique that would enable him to keep up with the improvements in some other parts of the world.

The milling process employed in these mills is the longest known to the writer. A greater number of mill-stock separations are made for subsequent purification and reduction and a greater number of grades of flour than are made in other countries. The extra equipment and handling required for these operations add to the cost of production. It is reported that since there has recently been little profit in milling Hungarian millers have tended somewhat toward a shortening of the milling process. It does not seem probable that a process will be reached corresponding to the United States process, but steps taken in this direction will probably not be retraced later, for today flour quality is more often attributed to the inherent quality of the wheat and less to the miller's cleverness or to the milling process used than formerly.

Mill laboratories in Hungary are not so well equipped as in the United States, nor does the cereal chemist play so important a part in the operation of the mill. Milling is looked upon as a highly developed art rather than a science, and more dependence is placed on the cleverness and experience of the miller than on any chemical analyses.

Routine moisture determinations are made on wheat and flour. Ash determinations are made on flour for mill-control purposes, but not necessarily for establishing the grade of flour. The miller primarily depends on the Pekar color test for guidance in limiting his flour extractions and in separating the various grades of flour. Protein-content determinations are seldom made, as it is believed that this factor is not a reliable indication of baking strength. Formerly the washed-gluten test was depended on to indicate the baking strength of a wheat or flour, and it is still widely employed. In a number of the larger mills the Brabender farinograph is now used for this purpose. It is reported that this apparatus was originally devised by a Hungarian, Stephen Hankoczy, director of the Cereal and Flour Research Institute at Budapest.

Hungarian millers claim flour extractions as high as 80 percent, but such extractions include red dog and some shorts. Bran is the only so-called mill offal, or byproduct, produced, but this bran is not of the broad flaky American type but is in small thin flakes.

Many different grades of flour are produced. These are based mainly on granulation and color differences and are designated according to a system that is partially indicative of granulation, color, and quality. The most usual assortment of flours produced is covered by the designations, No. 0gg, No. 0g, No. 0, No. 2, No. 4, No. 5, No. 6, No. 7, and No. 7½. Some mills make more grades of flour than these and some less, but the designations given them are in accordance with the preceding nomenclature. The letter "g" in the name signifies coarseness of granulation and the numerical digit the purity or quality of the flour. The designation No. 0g means a coarse, short, patent flour. No. 0gg also means a short patent flour, but of coarser granulation than 0g. If a still coarser short patent flour is made, it is designated as No. 0ggg. Some mills make a No. 2g flour, but the "g" degree of granulation does not extend to any of the grades below No. 2. In-between grades of flour are sometimes produced; they are designated No. 6½, No. 7¼, or by some other number which most nearly fits the quality.

The coarse flours are for use in making pastries, noodles, dumplings, and certain kinds of cakes. The No. 0 and No. 2 grades are the best quality fine-granulation flours produced in Hungary and are the grades generally exported. The No. 4 grade is the common white flour used in making domestic white bread. No. 5 grade is used in making the so-called half-brown bread; No. 4, mixed with No. 5, is also used in making half-brown bread. No. 6 grade is used in the production of brown bread. Grades of flour lower than No. 6 are usually used for feed. According to one Hungarian milling engineer, the ash contents (dry-matter basis) of the various grades of Hungarian flour are approximately as follows:

Grade	Ash content (dry-matter basis) Percent
Nos. 0gg, 0g, and 0.....	0.34 to 0.40
No. 2.....	.40 to .45
No. 4.....	.53 to .60
No. 5.....	.61 to .70
No. 6.....	.80 to 1.15
No. 7.....	1.50 to 1.90

The roller system of milling is used in the small gristmills in the country districts as well as in the large commercial mills. In this respect the milling industry is on a higher plane of development than in most European countries where the old stone-burr type of gristmill is still in active service.

At one of the gristmills visited—a mill with a grinding capacity of approximately 60 barrels of flour per 24 hours—farmers' wheat grists were being exchanged on the following basis: For each bushel (60 pounds) of clean wheat of average test weight the farmer received: 8.4 pounds of No. 0g flour, 27.0 pounds of No. 4 flour, 1.8 pounds of No. 6½ flour (shorts), and 14.4 pounds of bran, a total of 51.6 pounds.

A peculiarity of the milling industry is that many of the steam mills located in the villages and smaller cities operate Turkish baths to utilize the exhaust steam from their engines.

BAKING PRACTICES AND KINDS OF BREAD CONSUMED

A number of bread bakeries of the modern factory type are found in the larger cities. In the smaller cities and villages bread is made by the proprietor-operated shop type of bakery; this type is rather important in the production of luxury or special bakery products even in cities where the factory type is located. It is reported that nearly 95 percent of all bread consumed in Budapest is made in so-called bread factories. Only in country districts is bread made in the homes.

The factory type of bakery operates a chain of sales shops to distribute its products to the consumers, and it frequently sells in market places (fig. 21). It also sells some of its product wholesale to grocery stores, but not its luxury and special products.



FIGURE 21.—Bread stall in market place in a Hungarian town.

The equipment used by Hungarian bakers does not generally include many mechanical devices. Except in the factory-type bakeries, the machines used are a slow-speed mechanical mixer of the bowl type and a hand-operated dough divider for roll making. The usual oven is of the hearth-fired type.

Some village housewives make up their bread doughs and take them to the commercial bakery for baking, at a charge of about 4 filler per kilogram (0.5 cent per pound at currency rate of Feb. 20, 1934). Such bread is usually baked in loaves weighing 5 kg each.

The loaf type of bread consumed in Hungary is of three kinds or qualities, brown, half-brown, and white, named according to price, the brown bread being the cheapest. In Budapest, approximately three-fourths of the loaf type of bread consumed is of the half-brown kind. Brown-bread consumption amounts to about 24 percent and white bread to about 1 percent of the total. The half-brown bread has a pleasing flavor, and a medium fine-grained moist crumb, but is of light and spongy texture; the crust is harsh and thick and of a

dark-brown color. The loaves are generally of oval shape and of 2-kg size.

Rolls, much used, vary considerably as to form and composition. Usually they are made only from the best grades of flour, so differences in quality are chiefly due to the other ingredients and to the manner of baking. The "water bun", the cheapest kind of roll, contains only water, flour, yeast, and salt. In the more expensive rolls, milk, fat, and sugar in varying proportions are added. In general the quality of Budapest rolls is very good. They have a brown, thin, but crisp crust and a close-grained and somewhat dry interior.

The retail price of loaf brown bread is regulated by the Government, but for other forms and sorts of bread, bakers are permitted to charge their own prices. The prices prevailing in Budapest on May 25, 1934, for various kinds of loaf breads are given in table 32.

TABLE 32.—Wholesale and retail prices of loaf bread in Budapest, May 25, 1934

Kind	Wholesale price per pound ¹	Retail price per pound ¹
	Cents	Cents
Brown		2.97
Half-brown	3.78	4.63
White	4.33	4.87

¹ Converted at 0.20s cent to the filler.

The flour used in making Hungarian brown bread is a mixture consisting of 85 percent No. 4 (equal to a second clear or low grade) wheat flour and 15 percent rye flour. The half-brown bread is made from No. 6 (first clear) flour. The white bread is made from a patent grade of flour of medium-coarse granulation, said to have an ash content of about 0.40 percent.

The cost price to the baker, on May 25, 1934, of the various flours used in the production of bread in Budapest was as follows: No. 6 flour, 24 fillers per kilogram; No. 4 flour, 29 fillers per kilogram; patent flour, 31 fillers per kilogram.

A quick-fermentation sponge-dough method of procedure is generally used in the making of the common or half-brown bread. The leavening agents consist of sour dough and a small quantity of yeast. The two formulas in general use in the production of this bread are as follows:

Formula No. 1

Flour—100 kg.
Water—approximately 60 kg.
Salt—2 kg.
Yeast—never more than 1 kg.
Sour dough.

Formula No. 2

Flour—100 kg.
Water—approximately 50 kg.
Boiled potatoes—25 kg. (moisture content approximately 50 percent).
Salt—2 kg.
Yeast—never more than 1 kg.
Sour dough.

These doughs are prepared about as follows: A dough is prepared by mixing one-half of the flour intended for baking with some sour dough kept over from a previous baking, a small quantity of yeast, and with whatever quantity of water is necessary to give the desired

consistency. This dough is permitted to ferment for 2 or 3 hours; then the other half of the flour, the salt, and more water are added and mixed thoroughly. This is the final mixing. The resulting dough is allowed to ferment about three-fourths of an hour; it is then divided into portions of the desired size for baking, and the portions are placed in baskets for a half hour's proofing.

If the formula used in baking is the one that includes boiled potatoes this ingredient is added at the time of preparing the first dough. The baker buys these potatoes already boiled.

DIETARY HABITS

The Hungarian Nation consists of a mixture of peoples of different origin and race; consequently, the eating habits are somewhat varied.

PEASANTS

In summer the farmer rises at 3 a. m. and, before going to the field, eats a good-sized chunk of bread and some fat bacon. Around 8 a. m. he again eats some bread and bacon, but a smaller quantity this time. At 12 m. he has a mixed meal consisting of a gravylike soup made from vegetables, potatoes, or noodles, and plenty of bread. About 6 p. m. he has a light lunch of left-overs with sausage and bread. Each worker eats about a kilogram of bread a day. The noon meal is taken at home unless the place of employment is too far away. If it is to be eaten in the field, the worker either carries this meal with him or some member of the family brings it to him at noon. In winter the farmer rises at 6 or 7 a. m. and has about the same breakfast as in summer but has some brandy with it unless he owns a cow, in which case he has milk instead of brandy, and omits the bacon. There is no 8-o'clock lunch at this season. His next meal is at 12 m., consisting of about the same food as in summer, except that some sausage or cured pork is added. The evening meal comes before dark, and is about the same kind of lunch as that eaten in the summer. On Sundays and holidays the peasant's diet is more varied and includes such items as poultry, pastries, and wine.

In areas in which the dairy industry is well developed the peasant class eats a considerable quantity of cheese and drinks much sour milk and during the summer they have plums, tomatoes, cucumbers, and melons. As a general rule, coffee is not used except by the peasants of German extraction or in the western sections of the country. Wine generally is not taken with meals but rather is used in the evening or on holidays at the village inns.

CITY PEOPLE

In summer the working people rise at 6:30 to 7 a. m. and have a breakfast consisting generally of a cup of coffee with milk, bread, and butter. The next meal is at 2 p. m., consisting of some form of cold vegetable or fruit soup prepared with cream, bread, and a light meat garnished with potatoes or some other vegetable in season. The evening meal is usually a cold lunch of bread, butter, meat, fruit, and sour milk. Sometimes cheese is substituted for sour milk or cold meat. If meat is eaten at this meal, wine is frequently used instead of sour milk.

The well-to-do people will have rolls for breakfast instead of bread, and butter and jam or honey, and sometimes eggs or ham, and a cup of coffee with milk. At the midday meal, 2 p. m., a cold soup similar to that of the common people is served, together with poultry, fish, veal, or lamb, bread, and a salad, with possibly a light wine and a dessert. Among people of the older school of habits, this dessert is usually *Mehlspeisen* (a form of noodles eaten with sugar), but among people of modern tendencies, it is a pastry of the type used in western European countries. The evening meal in summer is a cold lunch consisting of cold meat with a salad, bread, and sometimes butter, cheese, and fruit. The beverage at the noon and evening meals may be of unfermented fruit juice, beer, wine, or sour milk. In winter the soups and the evening meal are generally served hot.

One outstanding characteristic of Hungarian cooking is the liberal use of paprika. Most hot foods are heavily seasoned with it.

Wine and beer are not used at home to any considerable extent but are drunk at cafes in the afternoon or in the evening. As a general practice there is no pronounced habit of drinking tea or coffee in the middle of the afternoon.

Bread is always an important item at each meal. Some macaroni and rice are used, but these foods do not play an important part in the dietary habits of the Hungarian people. Corn on the cob, both of the sweet and ordinary field varieties, is used during the summer season, but corn is seldom used in any other form as human food.

ITALY

Italy, including Sardinia and Sicily, is 119,714 square miles in area, or about the size of the State of New Mexico. Its estimated population in 1935 was 43,000,000. Next to the Union of Soviet Socialist Republics and France it is the greatest wheat-producing country in Europe. Formerly it was one of the largest importers of wheat in the world; recently it has become nearly, or wholly, self-sustaining in the production of that grain. It is the leading country of the world in per-capita consumption of durum wheat and one of the largest producers of durum. The outstanding characteristic of wheat consumption in this country is the important role that the use of alimentary pastes plays in the dietary habits of the people, for they are nearly as important as bread.

BREAD-GRAIN PRODUCTION

During the pre-war period, 1909-13, annual production of wheat averaged about 184,000,000 bushels (table 33). In post-war times production has increased considerably, averaging during the 5-year period, 1929-33, about 258,000,000 bushels, or approximately 40 percent more than the pre-war production. This increase has been due in part to an increase in acreage and in part to a greatly increased yield per acre.

TABLE 33.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Italy, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production			Yield per acre	Imports ¹		Exports ²		Apparent utilization ³	
		Durum wheat	Bread wheat	Total		Wheat	Flour	Wheat	Flour ⁴	Total	Per capita
Average:	1,500 acres	1,500 bushels	1,000 bushels	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
1909-13	11,793			184,393	15.6	56,331		3,637		237,187	6.8
1924-28	11,932			211,208	17.7	87,057	241	31	2,188	295,967	7.3
1929-33	12,073			258,016	21.4	41,419	562	21	5,594	294,412	7.1
Annual:											
1929	11,794			260,125	22.1	40,500	300	7	3,266		
1930	11,917			210,071	17.6	85,728	508	35	2,611		
1931	11,883	48,883	194,532	244,415	20.6	37,792	659	29	4,907		
1932	12,185	60,921	215,098	276,022	22.7	20,803	651	21	8,274		
1933	12,587	62,292	255,256	298,548	23.7	16,454	793	12	8,909		
1934	12,202	57,793	175,213	233,036	19.0	18,791	220	15	8,584		

¹ Year beginning July 1.² Converted to grain on the basis of 1.5 bushels per barrel of flour.³ Stocks at beginning and end of periods are disregarded.⁴ Includes flour in terms of grain.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 34.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Italy, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ²	Apparent utilization ³	
						Total	Per capita
Average:	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
1909-13	346	6,317	18.3	654	2	6,960	0.20
1924-28	307	6,357	20.7	276	80	6,553	.16
1929-33	297	6,522	22.0	612	1	7,133	.17
Annual:							
1929	308	6,903	22.4	575	1		
1930	302	6,127	20.3	1,323	1		
1931	304	6,521	21.5	356	1		
1932	288	6,313	21.9	579	1		
1933	282	6,789	23.9	268	64		
1934	278	5,607	20.2	375	61		

¹ Year beginning July 1; flour included, converted on basis of 6 bushels of grain per barrel.² Stocks at beginning and end of periods are disregarded.³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Rye production is not important in Italy; amounting to less than 3 percent of total bread-grain (wheat and rye) production. In 1934 it totaled only 5,607,000 bushels, which represented an 11.2-percent decrease from the pre-war 1909-13 average production (table 34). This decrease in production, however, was exceptional, because during 1924-33 the average annual production of rye slightly exceeded the pre-war average.

IMPORTS AND EXPORTS OF WHEAT AND RYE

During the 1909-13 pre-war period, wheat imports into Italy averaged 56,000,000 bushels. For a while after the war they were considerably higher, averaging during the 1924-28 period 87,000,000

bushels annually. In more recent years imports have declined to a point considerably below the pre-war average. These wheat imports have been almost wholly of grain; flour in recent years has amounted to only about 1 percent of total wheat imports.

Wheat exports from Italy, although not nearly so important as imports, warrant mention. During the pre-war period, 1909-13, annual exports averaged 3,637,000 bushels. During the post-war period, 1924-28, annual exports averaged about 2,500,000 bushels, but during the next 5-year period the average rose to 5,615,000 bushels. This rise, especially when considered along with the great decrease in imports, is significant of the trend toward self-sufficiency. Exports of wheat, unlike imports, have been almost wholly of flour or semolina.

The sources from which Italy obtains wheat imports include practically all the surplus wheat-producing countries of the world (tables 35 and 36). Prior to the war, Russia was the chief source; during the war and for several years immediately following, the United States was the principal source, but from 1928-29 to 1930-31 Canada held first place. Australia and Argentina have been heavy contributors to this trade.

TABLE 35.—Imports of bread and Durum wheats into Italy, by countries, average, 1925-27, annual 1928-33

Country and commodity	Year beginning July 1						
	Average 1925-27 to 1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
United States:							
Bread wheat	28,218	17,301	7,808	10,516	3,351	6,121	6,661
Durum wheat	6,028	1,781	3,039	3,351	518	1,060	915
Canada:							
Bread wheat	3,176	12,146	4,681	3,277	1,119	2,632	305
Durum wheat	11,486	21,521	11,300	13,176	3,556	1,756	676
Union of Soviet Socialist Re- publics:							
Bread wheat	1,448	0	1,531	15,807	1,596	1,938	117
Durum wheat	1,411	0	818	6,669	1,808	1,531	1,371
Argentina:							
Bread wheat	13,781	20,350	6,065	6,071	9,380	3,133	811
Durum wheat	158	370	141	532	708	23	146
Australia:							
Bread wheat	8,463	8,839	3,913	13,000	8,381	3,092	509
Durum wheat	0	0	0	0	0	0	0
Other countries:							
Bread wheat	5,589	3,628	6,378	6,650	1,788	559	3,861
Durum wheat	599	67	430	200	327	85	253
Total:							
Bread wheat	61,005	61,067	39,406	61,328	27,915	16,315	12,863
Durum wheat	10,682	29,712	16,091	21,397	9,817	4,158	3,691

1 If any, included in "Other countries."

Compiled by Foreign Agricultural Service Division from official sources.

TABLE 36.—*Foreign trade in wheat and wheat products, average 1925-27, annual 1928-33*

		Year beginning July 1					
Item	Average 1925-26 to 1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34
IMPORTS							
Wheat:							
Bread 1,000 bushels	61,005	61,097	30,400	61,328	27,915	16,315	12,803
Durum do	19,682	20,712	16,091	21,307	9,847	4,358	3,501
Flour short tons	2,682	4,816	4,359	11,020	14,348	14,182	17,263
Semolina do	158	41	25	71	108	37	25
Paste do	5	2	27	1	25	2	3
Ship biscuit do	12	22	21	20	17	12	10
EXPORTS							
Wheat:							
Bread 1,000 bushels	28	40	5	17	3	19	3
Durum do	6	4	2	21	26	2	0
Flour short tons	32,743	46,589	71,127	56,387	106,213	180,186	193,095
Semolina do	967	3,018	5,800	5,417	9,973	19,291	30,619
Paste do	15,016	15,795	14,475	15,206	12,776	11,305	10,231
Ship biscuit do	457	0	41	35	43	31	39

Compiled by the Foreign Agricultural Service Division from official records.

A considerable portion of the imported wheat is durum. It has come chiefly from Canada, the United States, and Union of Soviet Socialist Republics. Argentina and north Africa have contributed some, but the durum wheat from these two sources is not so well liked.

On the basis of present production trends, Italy is not likely to be a heavy importer of wheat in the future, except in poor crop years. Import requirements will be chiefly for durum wheats and the higher quality bread wheats. In former years a considerable quantity of medium- and low-quality bread wheats was imported into Italy along with some strong wheats; but as the increase in domestic bread wheats has been of the medium quality and weaker sorts, the foreign wheats needed will be chiefly of the stronger types.

Moreover, it is probable that most of the wheat importations will be as grain, mainly from certain surplus-producing areas in northern Africa and eastern Europe. Italy is within the inner range of possible markets of these areas, whereas in the case of other exporting areas Italy is in the outer range of possible markets. This difference in position naturally gives the former certain competitive advantages.

Italy's foreign trade in rye is not significant. Imports are rarely in excess of a million bushels yearly and exports are practically nil.

CHARACTERISTICS AND QUALITY OF ITALIAN WHEATS

The wheats produced are of the common and durum types. Of late years Italy has been the world's second largest producer of durum.¹⁷ Since 1931 its production has ranged from 49,000,000 to 63,000,000 bushels, or slightly more than one-fifth of the total domestic wheat crop.

¹⁷ Union of Soviet Socialist Republics, according to an article by Jasny (7) stands first in the production of durum wheat, which production before the World War amounted to somewhere between 150,000,000 and 200,000,000 bushels.

Nearly all of Italy's wheats of common type are of winter habit, red color, and soft texture; they usually resemble United States soft red winter wheats. Certain of the varieties are of the hard red spring wheat kernel type, but their production represents a very small proportion of the total. There is a relatively small quantity of white wheat. The domestic bread wheats, on the average, are superior in baking quality to other western European wheats.

The durum wheats are mostly of the amber-colored kernel type and are relatively starchy and low in gluten content. Some red-kerneled varieties are grown, but they are not popular with the milling trade.

The wheats of common species are used in the production of flour for bread making and general household cooking. The durum wheats are used principally for making semolina for macaroni and other alimentary pastes, but they are used some for making bread flour in those sections where the wheat is exclusively of the durum species. Millers and grain men report that only about one-fourth of the domestic durum crop is of suitable gluten quality for use in making first-quality macaroni and that the remaining three-fourths requires some admixture of stronger foreign durums in order to produce semolina of the desired quality characteristics.

The common wheats are grown in all of the Provinces, but the area of principal production is the Po River Valley in the northern part of the country. Durum wheat production is confined almost exclusively to the southern half of Italy and to the islands of Sardinia and Sicily. The latter island is the area of greatest production.

Since the advent of the current régime, much experimental work has been done by governmental agencies in the endeavor to improve wheat production and utilization. This experimental work has covered methods of cultivation, milling, and baking, as well as plant-breeding experiments; it is a part of the so-called battle of wheat, the object of which is to increase domestic production to the point of self-sufficiency. Better yielding and better quality varieties were produced. The improvements made in yield were remarkable, as is evidenced by the fact that yields during the 1929-33 period averaged 21.4 bushels per acre compared with 15.6 during the 1909-13 period. The milling and baking experiments have been performed for two purposes: to determine the milling and baking characteristics of the different varieties and to ascertain the methods of milling and baking that will produce the best results from domestic wheats.

In Rome and in Catania, Sicily, up-to-date cereal-testing plants are maintained by the Government. Machinery for macaroni making forms a part of the equipment. The plant at Rome includes, besides the laboratory type of experimental mill and bakery, a larger mill and bakery for experimental work on a commercial scale.

GOVERNMENTAL POLICIES AFFECTING THE GRAIN AND MILLING INDUSTRIES

For many years Italy has followed the policy of protecting its domestic agriculture from foreign competition by means of import duties and other forms of import restriction. Wheat producers were among the first to receive governmental protection, and have been given other aids and assistance of various kinds. The measures adopted to promote self-sufficiency and to improve economic conditions for the producers have included, in addition to import duties

and restrictions on wheat and flour, price fixing and milling regulations, placing compulsory limitations on the use of foreign wheats, establishing definite specifications of quality for the products that may be milled from wheat, and enforcing a Government-controlled scheme of rationalization upon the milling industry.

MILLING PRACTICES

Italy has a great number of antiquated small mills. There are also large mills of the modern type, many of which have well-equipped laboratories and are modern in equipment and methods of manufacture. It is reported that small mills are rapidly disappearing, but enough remain to account for probably the major portion of the potential milling capacity of the country. Naples, Genoa, and Venice are the principal milling centers.

A very considerable proportion of milling operations is to produce semolina for the making of macaroni and other alimentary pastes. The mills of modern type engaged in making bread flour use about the same line of equipment and the same manufacturing process as the German mills. The semolina mills are similarly equipped except that they have a more extensive middlings-purification system and a higher proportion of corrugated grinding surface. Many of these mills operate both as bread-flour and semolina mills. Many of the semolina mills operate plants for the manufacture of macaroni and the other alimentary pastes. These macaroni plants in most instances are directly connected with the mill.

In the production of bread flour Italian millers are less particular in regard to quality than are the millers in most other countries in western Europe. Cheap wheats of medium or weak quality are generally acceptable for this purpose. Flour extractions are rather high, ranging from 74 to 79 percent. In the production of semolina, however, wheats of high quality are preferred. The consumer, although somewhat indifferent as to the quality of his bread, is very particular as to the quality of his macaroni or spaghetti. Consequently, in the production of semolina, the miller seeks wheats of best quality. Wheat of the durum type is best suited for this purpose and always has been preferred, but owing to limitations recently placed on macaroni prices many millers have found it necessary to cheapen their product by the use of cheap common wheats. Argentine common wheats have been most often used for this purpose. Their use has been much more prevalent in northern than in southern Italy. In exceptional cases, even a small percentage of rice, bean, or white maize grits has been added to wheat semolina to cheapen it.

Italian semolina millers appreciate quality and are fully aware of the differences in quality and milling properties of the durum wheats from the various countries. The quality characteristics or properties most desired in these wheats are high test weight, high gluten content, amber color, vitreous texture, and low moisture content. Objectionable characteristics include the presence of starchy kernels, soft-textured kernels, red-colored kernels, wheats of a class other than durum, shrunken kernels, or low test weight, weevil infestation, black-tip kernels, ergot, and foreign odors and materials that cannot be removed by ordinary cleaning methods or washing.

The chemical bleaching of flour or semolina is not practiced but it is a common practice to color the semolina artificially by using a German coloring matter called Giallo Nafstol.

Several grades or qualities of semolina are made. The best grades are of coarse or medium-coarse granulation. Some flour of rather poor quality is produced and is usually disposed of by blending with flour made from bread wheats for making the cheaper breads.

MACARONI MANUFACTURE

The manufacture of macaroni and other alimentary pastes in northern Italy is chiefly by large macaroni plants of the modern factory type located at milling centers. This kind of plant is also found at the principal milling centers in southern Italy and on Sicily and Sardinia, but much of the macaroni used in these parts of the country is made in small shops which also operate as bread bakeries and retail sales stores. The work in these shops is usually done by the owner and members of his family. The preference for fresh paste, and ancient traditions make it possible for the small establishments to carry on alongside the large modern factories. The making of alimentary pastes in the small shops is usually featured by conspicuously spreading out or hanging up a lot of the paste along the sidewalk or in the shop itself. The machinery used is generally of modern construction and type and is nearly always operated by electricity. These shops make from 450 to 2,000 pounds of paste a day.

The process employed in the manufacture of pastes is much the same everywhere. Variations pertain only to certain details rather than to the process as a whole. Some prefer to make stiffer doughs than others; some use warm water and some use cold water in mixing their doughs; some use more improved methods of drying the paste than do others.

Considerably over 100 forms of alimentary pastes are made. These may be divided according to shape or form into certain types known by special names. The term spaghetti is usually applied to the long, stringy, or bar type, and macaroni to the cylindrical type. These two types are made in various diameters, lengths, and designs. Besides these there are shell, noodle, and soup types, also in various sizes and designs.

The poorer grades of semolina are used in the manufacture of the smaller types and the very poorest grades or qualities in the soup types. The long types of paste, such as spaghetti, require the best-quality semolinas. Most paste manufacturers use artificial coloring matter in certain types of products.

According to Italian paste manufacturers, the characteristics which distinguish a good-quality paste product from a poor one are as follows: The paste product should have a firm texture after 20 to 25 minutes' cooking. Pastes that become mushy or pasty in cooking are considered of inferior quality and are believed to be less digestible than those of firmer texture. Other qualifications include the retention of original size and shape during cooking, creamy color, and freedom from stickiness, specks, and blotches.

BAKING PRACTICES

The baking of bread is done chiefly in small family-operated shops. Bakeries of the factory type are as yet not much in evidence except in the larger cities.

The breads produced are almost wholly hearth-baked and are of the crusty type. Compared with those of France, they have a closer texture and are softer. The common breads are inclined to be slightly gray in color, chiefly because they are generally made from a clear flour. The ingredients used in the common breads are flour, water, yeast, and salt.

Rolls, which are popular among the well-to-do, especially for breakfast, are usually of a very good quality. In making them, shortening, sugar, and milk are generally used.

DIETARY HABITS

Breakfast is generally a light meal, consisting of rolls or bread and coffee (the latter consisting mostly of boiled milk). At noon a big meal is served, including soup or spaghetti, meat, vegetables, cheese, bread, fruit, and wine. About 4 p. m. it is customary to have a light lunch of bread and jam. The evening meal which comes at about 8 p. m. is another big meal, with about the same assortment of foods as used at noon.

Alimentary pastes of some sort play an important part in the dietary habits of the Italian people. Among the poorer classes they are the principal food. Other important items are citrus fruits, cheese, green vegetables, and tomatoes. Potatoes are important, but not nearly to the extent that they are in Germany or certain other European countries. Wine is the common drink and is served with all meals except, possibly, breakfast.

NETHERLANDS

The Netherlands is second in density of population among the countries of Europe. Nearly 8,333,000 people inhabit this country, which is 12,761 square miles in area or approximately the size of the State of Maryland. Agriculture is an important industry, but in the production of bread grains the country is far short of being self-sustaining; this is especially true in the case of wheat. Moreover, owing to the weak quality of domestic wheat, self-sufficiency of production is not considered desirable. Before the World War about equal quantities of wheat and rye were consumed, but since the war there has been a decided change, and at present wheat consumption is more than 50 percent greater than rye consumption.

BREAD-GRAIN PRODUCTION

During the pre-war period, 1909-13, wheat production was nearly one-third that of rye (tables 37 and 38). In post-war times wheat production has greatly increased while rye production has remained practically stationary; in 1934 more wheat than rye was produced.

TABLE 37.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in the Netherlands, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ²	Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:													
1909-13	128	9	137	5,483	354	5,837	42.4	22,018	7,958	374	1,300	27,103	4.6
1924-28	180	36	216	7,805	1,302	9,107	43.0	26,316	4,200	948	201	31,713	4.8
1929-33	94	18	112	4,335	829	5,164	48.8	24,685	6,057	772	481	31,313	4.6
1930	129	13	142	5,450	567	6,017	42.6	28,050	8,774	1,151	277	38,152	4.6
1931	142	50	192	6,155	1,590	7,745	35.2	29,042	2,380	105	171	31,598	4.6
1932	252	45	297	11,140	1,692	12,832	43.2	25,333	1,098	833	171	27,334	4.6
1933	286	53	339	13,149	2,170	15,319	46.3	24,191	2,082	2,169	271	28,631	4.6
1934	304	55	359	13,149	2,170	15,319	47.0	18,730	2,025	1,288	22	21,045	4.6

¹ Year beginning July 1, except 1909-13, which begin Aug. 1.² Converted to grain on basis of 4.5 bushels of grain per barrel of flour.³ Stocks at the beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 38.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in the Netherlands, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	557	10,175	29.0	23,657	17,880	27,843	4.8
1924-28	489	15,281	31.3	1,812	1,009	15,027	2.5
1929-33	445	15,365	34.5	8,722	536	23,161	2.9
1929	488	18,300	37.5	4,943	207	23,040	2.9
1930	475	14,892	31.4	11,267	1,454	12,721	2.5
1931	445	14,167	31.8	7,017	805	13,357	2.5
1932	410	13,863	33.8	8,029	172	13,697	2.5
1933	408	15,092	38.2	9,726	40	15,056	2.5
1934	450	16,291	36.2	9,260	422	15,829	2.5

¹ Year beginning July 1, except 1909-13, which begin Aug. 1; flour included, converted on the basis of 6 bushels of grain per barrel of flour.² Stocks at the beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

The average yearly production of wheat in the Netherlands for the pre-war period 1909-13 was 4,896,000 bushels. Since the war production has been somewhat higher, averaging until recently about 6,000,000 bushels. Beginning in 1931 the Government adopted a policy of maintaining a price level for domestic wheats considerably above the open-market price for foreign wheats, and making the use of domestic wheats by the domestic millers compulsory up to a certain percentage. This policy, and the depressed prices prevailing for those agricultural products which in years past were produced in excess of domestic requirements, resulted in a decided increase in the acreage seeded to wheat.

This increased acreage in combination with the prevalence of ideal growing and harvesting conditions in 1934 resulted in a crop of 17,196,000 bushels, representing an increase in production of approximately 250 percent over the 1909-13 production average. The increases occurring in recent years undoubtedly were higher than had been anticipated and probably more than were desired, because in October 1932 the Government announced that the subsidies on wheat during 1933 would be paid only when the area sown to wheat did not exceed 30 percent of the 1932 cultivatable area of the farm.

IMPORTS AND EXPORTS OF WHEAT AND RYE

The Netherlands is both an exporter and an importer of wheat and rye (including flour), but imports have always greatly exceeded exports.

Net imports of wheat during the pre-war period, 1909-13, averaged about 13,000,000 bushels yearly. During the post-war period, 1924-28, the yearly average increased to 22,000,000 bushels, and during the 1929-33 period to 25,000,000 bushels. Imports of flour (in terms of wheat) during 1909-13 averaged approximately 9,000,000 bushels, but since then have declined considerably, averaging during the period 1929-33 only 4,000,000 bushels.

Net imports of rye (including flour) during the 1909-13 period averaged nearly 12,000,000 bushels. During the period 1929-33 they averaged less than 8,000,000 bushels, which represents a very considerable decline from pre-war times. Since rye production has not increased in post-war times, the decline in imports of this grain is also indicative of a decline in its consumption.

Until 1932 the United States had always been either the most, or the second most, important source of wheat and wheat-flour imports into the Netherlands (table 39). Since 1931, however, imports from the United States have shrunk to minor importance. The bulk of the foreign wheat used in recent years has come from Canada and Argentina. Other important sources of supply have been the Union of Soviet Socialist Republics, Rumania, and Australia.

TABLE 39. Imports of wheat, including flour, into the Netherlands by country of origin, average 1923-27, annual 1928-33, by calendar years

Source	Average 1923-27	1928	1929	1930	1931	1932	1933
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Canada.....	4,039	7,873	1,144	2,532	3,257	7,280	8,766
Argentina.....	1,086	7,252	12,655	6,355	2,957	7,005	7,716
Union of Soviet Socialist Re- publics.....	1,011	9	(¹)	1,630	11,592	3,775	2,890
United States.....	15,196	10,798	9,120	14,180	7,251	3,346	2,202
Germany.....	591	979	736	272	1,960	2,788	3,070
Australia.....	620	127	231	714	2,261	2,300	1,033
Rumania.....	121	79	4,530	1,488	1,795	929	1,101
Belgium-Luxemburg.....	2,429	2,056	1,324	1,021	1,053	925	1,372
France.....	165	175	251	2,370	1,565	635	1,201
Other countries.....	530	155	361	721	622	385	457
Total imports.....	29,651	29,803	29,321	31,005	31,236	29,458	29,321
Total exports.....	2,171	3,308	800	723	1,357	2,970	3,161
Net imports.....	27,480	26,495	28,521	30,282	29,879	26,488	26,160

¹ If any, included in other countries.

² Includes 80,000 bu. re-exported.

³ Includes 60,000 bu. re-exported.

Foreign Agricultural Service. Compiled from *Nederland Jaarstatistiek van den In-En-Doorvoer*, 1923-33.

CHARACTERISTICS AND QUALITY OF DUTCH WHEATS

The wheats produced are of a very soft character and are chiefly white in color. Some red wheats are grown, but they are not popular with the farmers and constitute only a small percentage (probably not more than 5 percent) of the total. The wheats from the Province of Zeeland, the most important wheat-producing area of the country, are said to be the softest wheats produced in Europe, but they are of excellent flavor. The wheats grown in other sections of the country are also soft, but not to the same degree, nor do they possess the same excellence in flavor.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

The Netherlands has long been known as a free-trade country. The Government has always been hesitant about adopting a policy of protective tariffs for agricultural products but has not hesitated to intervene in other ways to relieve the current agricultural depression. In 1934 the chief measures that had been adopted pertaining to wheat and flour were: Restrictions on the use of imported flour; compulsory milling and mixing quotas for domestic wheat; the fixing of prices for domestic wheat; and the adoption of a system of monopoly fees on imports of wheat and flour, which function as duties although they are not so called. These measures are beneficial to the farmer and, in certain instances, also benefit the miller, because through the elimination of certain elements of competition from foreign millers their business opportunities on the home market are increased.

On July 4, 1931, a governmental decree became effective making the use of domestic wheat compulsory up to 20 percent in the milling mixtures. September 7, 1931, the percentage was raised to 22½ percent, August 8, 1932, to 25, and February 13, 1933, to 35, which percentage was still in effect in June 1935.

Dutch wheats are low in gluten content and are unsuitable for bread flours, but are excellent for biscuit and cake flours. Generally, they are high in gassing power, of high moisture content, and in ordinary years often contain an appreciable percentage of sprouted or partially sprouted kernels. The moisture content of these wheats even in the driest years ranges from 15 to 19 percent and in wet years may go as high as 23 percent. The harvests of 1932, 1933, and 1934 were exceptionally dry and the crops were considerably above the average in quality and condition. This fact has made it possible for the domestic millers to make a fairly satisfactory bread flour from wheat mixtures containing as much as 35 percent of domestic wheat, but the opinion has been expressed by some millers that this will not be possible with a crop of average or lower-than-average quality and condition, and when such a crop occurs the millers will probably insist that they be permitted to use a lower percentage of inland wheat in their milling blends.

Before governmental milling regulations became effective, domestic wheats were not used in bread-flour mixtures, except in small percentages usually to increase the gassing properties of the resultant flour. Their principal use has been for feeding purposes and for making biscuit flours and whole-wheat meal for graham breads. Because of their excellent flavor, the Zeeland wheats are particularly desired for wheat-meal making, but only when of sound condition

can they be used for this purpose. Requirements as to soundness of grain for biscuit flour are not so strict so some of the wheats that are unsuitable for wheat meal are useful for biscuit flour.

Foreign wheat and flour import requirements formerly amounted to about 30,000,000 bushels annually; but, with the increase in production and compulsory use of domestic wheats, these requirements have decreased.

In a trade agreement with the United States, effective February 1, 1936, the Netherlands agrees to buy annually from the United States a quantity of wheat or flour amounting to not less than 5 percent of the annual total Dutch imports of milling wheat, and of the annual total consumption of wheat flour.

MILLING PRACTICES AND WHEAT PREFERENCES

According to census reports (2) there were 18 commercial mills of the modern type operating in the Netherlands in 1933 and about 700 small mills of the grist or custom-milling type (fig. 22). These latter as a general rule make only whole-wheat flour and grind only domestic grain.

The wheat consumption of mills handling less than 2,205 short tons of grain per annum during 1933 is estimated at 1,323,000 bushels. Data showing the bread grain milled for the years 1930 to 1933, inclusive, in Dutch flour mills handling a minimum of 2,205 short tons of bread grain per annum are presented in table 40.

TABLE 40.—Quantity of wheat and rye milled in Dutch mills, 1930-33¹

Year	Wheat	Rye
	(1,000 bushels)	(1,000 bushels)
1930.....	23,866	1,173
1931.....	21,198	1,802
1932.....	29,218	1,710
1933.....	27,712	2,082

¹ Minimum capacity of mills, 2,205 short tons of grain per annum.

Thus, from 1930 to 1933 in the Dutch mills indicated above, wheat grindings increased 16.1 percent, and rye grindings 41.3 percent.

The method of milling employed in Netherlands is like that used in western Germany, and the mills are usually equipped with German machinery. The larger mills have chemical and baking laboratories for testing the quality of wheat flour and for making routine determinations for mill-control work. Little attention is given to ash and protein content. Gluten quality, gassing properties, and the reaction of the wheat to various forms of treatment and conditioning receive most of the attention of the chemist. Laboratories are not so well equipped for routine analytical work as in the United States, but contain the necessary equipment for it and for research work of various sorts. A greater proportion of the chemists' time is devoted to research than is the case in American mill laboratories. Gluten content is determined by the washing method and is based on the weight of wet gluten. Gluten quality is judged from the feel and color of the wet gluten and by measuring its resistance to stretching. Some laboratories are equipped with the Brabender farinograph and fermentograph machines. Readings from these machines are con-

sidered very useful in indicating the characteristic quality of wheats and flours and in indicating the kind of conditioning that should be given to the wheat. One miller visited was much concerned over



FIGURE 22.—A Dutch windmill in operation. Most of the milling in the Netherlands, however, is done in modern-type flour mills.

the maltose content of wheat. He maintained his milling mixture at a maltose content of 1.6 to 1.7 percent. Chemical treatment of flour for baking-quality improvement is widely practiced.

Foreign wheats are blended or mixed according to gluten characteristics and are cleaned and washed separately from domestic wheats. Domestic wheats are usually not washed. United States hard winter is the only wheat that the Dutch mills grind without mixing with other wheats. Argentine wheats are considered too weak and Canadian wheats too strong for milling alone. The price of hard winter in 1935 was out of line with those prevailing for Argentine and Canadian wheats. Present regulations requiring the use of 35 percent of domestic wheats make it necessary that higher percentages of strong wheats be used in mill mixtures for bread flour than formerly. Contrary to their beliefs, the compulsory use of domestic wheats in mixtures for bread flours has taught the millers that this practice is possible and the experience thus acquired will probably have some permanent effect on future milling-mixture practices. Under regulations prevailing in the summer of 1933 the following mixture of wheats was considered suitable for bread flours: 40 percent of Canadian No. 2 Northern Manitoba, 25 percent of Argentine, and 35 percent of domestic wheat. Some mills were using even higher percentages of Canadian; but the low price of Argentine wheat was encouraging a tendency toward an increased use of it. Formerly a relatively higher proportion of the lower grades of Northern Manitobas was used, but these wheats are not suitable to use with domestic wheat. Northern Manitoba wheat of No. 2, or better, grade is now generally required.

U. S. No. 2 Hard Winter is considered to be about equal in quality to No. 3 Manitoba. All of our eastern wheats and our Pacific coast soft wheats are considered useful for milling mixtures. Pacific coast hard wheats are considered unsuitable. Danubian wheats are considered about on a par with Plate wheats, but both are variable in quality and usually too weak and soft for use except as a filler. Union of Soviet Socialist Republics wheats are variable in quality, ranging from very weak to very strong. Australian and Pacific coast white wheats are suitable for biscuit and cake flours and whole-wheat meal, but are not much used for the latter because the small mills, the principal manufacturers of this type of flour, find it more convenient to use domestic wheats.

Canadian and United States wheats are liked for their uniformity as well as for their good quality, and the trade is satisfied to buy them on certificate final terms. One miller thought it might be necessary for United States grade certificates to specify the crop year of the wheat before much business could be done again in United States wheats. At present one firm imports about 75 percent of the foreign wheat received in the Netherlands. It has an agreement with a group of millers representing that percentage of the milling capacity of the country to the effect that it will import exclusively for this group and in return the millers in this group have agreed to buy only through this company.

FLOUR CONSUMPTION AND BAKING PRACTICES

Practically all the bread and most of the cakes and pastries consumed are baked in commercial bakeries. Very little is baked by the housewife. The commercial bakeries number nearly 14,000, most of which are of the small-shop type. These bakeries used in 1932, 5,847,000 barrels of wheat flour and whole-wheat meal, of which 5,495,000

barrels represented domestic-milled flour and 352,000 barrels imported flours. There were 9 bakeries with a consumption of more than 562 barrels of flour per week, 203 with a consumption of 57 to 562 barrels per week, 1,458 with a consumption of 15 to 56 barrels per week, and 12,037 with a consumption of 14 barrels or less per week. The combined consumption of this latter group accounted for 50.6 percent of the total quantity of flour consumed by commercial bakers, the 15- to 56-barrel group for 26 percent, the 57- to 562-barrel group for 16.9 percent, and the more than 562-barrel group for 6.5 percent.

The small bakeries are widely distributed. One or more are found in every community or settlement. Practically every householder, whether in country or city, is within easy reach of one. Prices charged by the bakers for their products are relatively low compared with the cost of flour. In Amsterdam on May 8, 1933, wheat flour bread was retailing at 15 Dutch cents (7.09 cents, United States) per loaf of approximately 1½ pounds. Whole-wheat meal breads were slightly cheaper. Convenience to the bakery shop and the low prices charged for bread are probably the factors mainly responsible for the fact that not much baking is done by the housewife.

According to the Labor Act of 1919 bakers are not permitted to begin work in their shops before 5 a. m. nor to start their delivery men from their shops before 9 a. m. No sales of fresh breads or rolls are permitted before 10 a. m., but breads of the previous day's baking may be sold at an earlier hour. Some believe that these restrictions, which make it impossible for the people to obtain fresh breads for breakfast or in time for use in lunches carried by workers have resulted in a considerable reduction in the per-capita consumption of breads.

The decrease in consumption reported by different people interviewed varied from 30 to 35 percent. These estimates are believed to compare present conditions with pre-war conditions. For recent years this alleged decrease is not supported by the statistics available in the Berlin office, which, however, deal with the utilization of wheat for all purposes and do not show separate figures for flour consumption. Furthermore, the apparent increase in utilization of other grains makes it improbable that there has been an increase in wheat consumption for feeding purposes sufficient to account for the increased total utilization which has occurred and at the same time to offset the reported decrease for human consumption. If any decrease has occurred in bread consumption, probably other factors besides the legislation here referred to have been partly responsible. The change in working habits brought about by the invention of labor-saving machinery and the improvement in transportation which have made possible a more varied diet might have some tendency to decrease consumption of bread.

A large Rotterdam baking concern operating a chain of sales shops has adopted a method whereby fresh bread can be supplied to its customers at all times of the day. This method involves the freezing of bread. It is said that bread, if frozen, will remain fresh for 2 or 3 days. As it adds 20 percent to the cost of bread, it is not expected that this method will be widely used.

The regular method of baking used in the Netherlands is one employing a short fermentation period for the dough. The mixing

machines are of the slow-speed bowl type; they are not equipped to operate automatically as are those used by German bakers.

The baking formula used is about as follows:

<i>Water Breads</i>	<i>Milk Breads</i>
1½ to 2 percent of yeast	1½ to 2 percent of yeast
2 percent of salt	2 percent of salt
No sugar	Liquid milk in sufficient quantity and richness to give a fat content of 3 percent in the baked loaf
Water	Water
Flour	Flour
(Fats in some breads)	

Fermentation of dough takes about 1½ hours and proofing 30 to 35 minutes. Approximately 75 percent of the bread is baked in pans. The larger proportion of the bread used is baked from wheat flour. Rye breads are not much used. Probably one-fourth to one-fifth of the bread used is made from whole-wheat meal; this bread is used chiefly by people who cannot afford white breads.

The wheat-flour breads are of the United States type and are of excellent quality. Milk is used to a considerable extent in the production of this bread. The interior is of soft, light texture, and fairly small cells. The crust is of golden-brown color and very thin. To produce these results with the method used requires a flour with quick dough-developing properties, good gassing power, and good gluten quality. In the larger shops where the doughs are handled quickly, gluten stability and long fermentation tolerance are not important, but when the flour is for use in small shops these properties are of considerable importance, for in the small bakeries doughs are usually handled in piecemeal fashion over a fairly long period.

DIETARY HABITS

The eating habits of the people are about as follows: Breakfast for the upper class consists of bread or rolls, or toast with butter and jam, coffee, and cold meats or cheese. Breakfast for the lower and middle classes often consists of porridge instead of bread or rolls, a cup of coffee, and an egg. At about 11 a. m. the people usually have coffee, but there is no lunch at this hour except for those who remain at home.

At about 1 p. m. the heaviest meal of the day is eaten by all except those who cannot eat at home and who cannot afford a warm meal at a restaurant. This meal consists of meat, vegetables, and potatoes, with no bread; but for those who must carry their lunch, there are meat or cheese sandwiches. At 4 p. m. tea biscuits or cakes are served with tea.

Supper time comes from 6 to 7 p. m. Families in which the workers cannot have a warm meal at noon make this the heavy meal of the day, in which case the meal consists of practically the same foods as the midday meal previously described, except that a hot drink, like coffee or tea, is included. For people who have had a heavy meal in the middle of the day, supper consists of bread and cold meats with tea. The drinking of tea is usually continued until bedtime, when some people, especially the older people, have a bowl of porridge.

Wheat-meal bread, the poor man's bread, is not popular with the middle and upper classes, and so some of the better shops do not carry

it, but it can always be found in the shops in the poorer districts. Consumption of it is said to be decreasing. The rolls used are of various kinds, but are usually of soft texture and excellent quality. One kind, often seen, contains raisins, citron, and nuts. The Netherlands is famous for the zwieback or rusk type of bread, and much of it is used. The cakes and pastries displayed in bakery shops include the sponge and fruit types of cakes, tarts, and short breads.

NORWAY

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Norway has a population of slightly less than 3,000,000, so the quantity of bread grains necessary to meet consumptive requirements is comparatively small. Domestic production of those grains, however, falls far short of requirements, so that Norway is chiefly dependent upon the outside world for grain supplies. During the 5-year period 1929-33 the total production of wheat and rye averaged about 1,200,000 bushels, of which wheat accounted for around 700,000 bushels and rye about 500,000 bushels (tables 41 and 42). During the same period consumptive requirements for these grains averaged about 15,000,000 bushels. Norway's bread-grain production, therefore, constitutes only about 8 percent of its requirements.

TABLE 41.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Norway, average 1900-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production bushels	Yield per acre	Imports		Apparent utilization	
	Winter	Spring	Total			Wheat	Flour	Total	Per capita
Average	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
1900-13			12	306	25.5	3,800	2,871	6,670	1.7
1924-28		21	21	501	24.8	3,158	3,178	7,230	2.6
1929-33	2	27	29	713	24.6	5,312	2,995	8,300	3.2
Annual:									
1929	2	28	30	750	25.0	3,818	3,282		
1930	2	28	30	720	24.0	5,083	3,192		
1931	2	27	29	592	20.4	5,628	3,250		
1932	2	26	28	719	26.8	5,618	2,616		
1933	3	25	28	755	27.0	6,083	2,171		
1934			16	1,201	26.2	6,782	2,111		

¹ Year beginning July 1, except 1900-13, which began Aug. 1. No exports reported.

² Converted to grain on basis of 1.5 bushels of grain per barrel of flour.

³ Stocks at the beginning and end of periods are disregarded.

⁴ Season 1933-34.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 42.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Norway, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports	Exports	Apparent utilization ²	
						Tot. 1	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	37	674	26.3	10,611	0	11,566	1.9
1924-28	22	600	27.3	7,188	0	7,788	1.8
1929-33	17	186	28.6	5,853	0	6,339	2.2
Annual:							
1929	18	218	29.9	7,067	0		
1930	19	256	29.3	7,216	0		
1931	17	278	27.2	6,284	0		
1932	16	222	32.6	7,046	0		
1933	16	178	27.4	7,067	0		
1934	17	167	29.3	1,750			

¹ Year beginning July 1, except 1909-13, which began April 1; flour included, converted on the basis of 4 bushels of grain per barrel of flour.

² Stocks at beginning and end of periods are disregarded.

Season 1933-34.

Compiled by the Foreign Agricultural Service Division from official reports, and from publications of the International Institute of Agriculture.

Since the World War production of wheat has consistently increased, whereas production of rye has just as consistently decreased. Compared with production in the 1909-13 period, the average annual wheat production in 1929-33 had increased 133 percent, while rye production decreased 50 percent. A similar tendency was shown in annual consumption of these grains, which in the case of wheat increased from an average of 3,980,000 bushels in 1909-13 to an average of 8,930,000 bushels in 1929-33, and in the case of rye decreased from 11,566,000 bushels to 6,339,000 bushels.

On the basis of 1929-33 production and consumption figures the average annual import requirements of wheat (including flour) amounts to more than 8,000,000 bushels and of rye approximately 6,000,000 bushels. Thus, imports represent a very high proportion of total consumption, and it is probably because of this fact that Norway is one of the few remaining European import markets for foreign flour. But even there flour imports are decreasing rather rapidly (see p. 135 for data on decrease in flour imports) owing to certain import regulations which favor the importation of wheat over that of flour.

CHARACTERISTICS AND QUALITY OF NORWEGIAN WHEATS

Most of the wheats produced are of spring habit. Wheats of winter habit are produced only in the southern part of the country and do not constitute more than 5 or 10 percent of the total production. The spring wheats are of fairly hard texture and of good appearance, but are said to be deficient in protein and of poor baking quality. The principal varieties grown are Børsum, Frøya, and Asshete—a new variety. The winter wheats are poorer in quality than the spring wheats, and have a starchy, soft appearance. They are of a small-kernel type. In quality characteristics they probably more nearly resemble United States "western red" wheats than "red winter". Thorsø is the principal variety of winter wheat grown.

The protein content of Norwegian wheats usually averages between 9 and 10 percent (basis 13.5 percent moisture).

Some work is being done on variety improvement, but this appears to be chiefly under the direction of the State Grain Monopoly. The principal objective is the development of varieties of better baking quality and shorter maturing habit. Some effort is being made to increase the production of bread grains, but it is not likely that production will approach a self-sufficiency basis. The climate is not very suitable for grain; the winters are long and the harvests are usually wet. Because of dampness and lack of sunshine difficulty is often experienced in harvesting the grain. To prevent damage, it is customary to place the cut grain on wires stretched between poles, but in spite of these precautions the grain often contains an appreciable percentage of germinated kernels and a high moisture content—usually more than 17 percent and is sometimes over 20 percent.

A portion of Norway's wheat requirements is for animal and poultry feeding; and as domestic wheats are low in baking quality and milling value, it is probable that in past years a goodly proportion of the home-grown wheat was so used. In recent years, however, with the price of domestic wheat fixed by the Government at a position considerably higher than that for foreign wheats, it is not likely that much of the domestic crop has been used for feeding. Imports of foreign wheats intended for feeding are cosinized (colored) before being offered to the public in order to prevent their use for other purposes.

GOVERNMENT REGULATIONS AFFECTING THE MILLING AND FLOUR TRADE
(STATE GRAIN MONOPOLY)

The import trade in wheat and other grains and their flours has been under the complete control of a State grain monopoly (Statens Kornferretning) since 1928. The purchases are made on the basis of offers which are submitted daily by agents of foreign grain exporters and mills. The purchasing is done in accordance with well-established business principles. Full consideration is given to the qualitative, as well as the quantitative, requirements of the domestic market. Within the limitations of quality, price is the controlling factor in the purchases. The State Grain Monopoly keeps well informed on the market situation in foreign countries and tries, like a private firm, to take advantage of the market fluctuations.

The purchases of grain and flour are sometimes on f. o. b. and sometimes on c. i. f. terms. From North America the grain is generally bought f. o. b. the different loading ports, whereas the grain contracted in other markets is bought c. i. f. one or more Norwegian ports. Wheat flour is generally bought c. i. f. Norway. With f. o. b. purchases, the monopoly provides the necessary tonnage, and Norwegian steamship lines are used to a large extent in this trade.

Grain and flour bought on f. o. b. terms are insured under a floating policy with the leading Norwegian sea-insurance companies. Payment is generally made cash on presentation of shipping documents, for instance in New York, London, Rotterdam, etc., with the option of 90 days' sight draft, discount and stamp for buyers' account. The discharge of a grain or flour vessel is always inspected and quality, condition, and quantity carefully noted.

According to a contract between the monopoly and the Norwegian merchant mills, the mills are under obligation at a fixed rate to

accept the grain imported, and to grind it according to instructions. Further, the mills are required to store the flour and the mill feed, and to sell the products on their own responsibility. The mills must give a monthly account of the sales. On basis of a similar contract, the flour imported is taken over by the importers, who distribute the flour at their own risk for a certain fixed compensation.

The selling price for mill products is the same throughout the country, freight being paid by the monopoly. Changes in price are telegraphed to all mills and wholesale dealers and are put into force simultaneously all over the country. The selling prices are calculated on the basis of prices on the world market, but only on its broad features, as frequent changes have to be avoided if possible. The new prices apply to all stocks at mills and at wholesale merchant establishments and the losses on stocks, if any, are adjusted by the monopoly according to agreement. By the establishment of the monopoly, the import duty was abolished, except for oats and oat products. Besides its duty to provide the country with imported grain and flour, the monopoly also has to carry through certain arrangements with the view of supporting domestic grain production. Accordingly, the monopoly is required to buy all grain suitable for human consumption that is offered by the farmers.

Owing to the fact that the Norwegian farmers generally sell in small quantities, which may vary in quality and condition and thereby give considerable trouble to the mills, the monopoly has built grain elevators in several central districts where the different parcels are collected. To obtain uniformity of quality, the grain is mixed, and if necessary is dried and cleaned, and thereafter distributed to the various mills. Part of the grain collected in these elevators is sorted out and kept as a reserve for seed in case the requirements for seed grain should not be regularly covered.

The State Grain Monopoly maintains in Oslo an elaborate cereal-testing laboratory consisting of an experimental bakery and mill and chemical apparatus for routine and experimental chemical analysis work. The experimental mill is complete in detail and automatic in operation. It consists of two pairs of break rolls, one pair of sizing rolls, and one pair of smooth rolls, a sifter, a purifier, an aspirator, a dust collector, a rolling-screen separator, a milling separator, and a scourer. The wheats ground on this mill are milled to a flour extraction of approximately 50 percent.

In this laboratory samples of the foreign flours and wheats purchased by the monopoly are tested for quality. The tests of the flours are primarily to ascertain if the delivery is in accordance with the specifications under which the purchase was made. The tests of the wheat samples are chiefly to obtain information that will be useful to the monopoly in determining the mixture of wheats suitable for the trade's needs and that will serve as a basis for allocating to the various mills the different wheats that are imported. In making these allotments some consideration is given to the millers' preferences for various types, but to a large extent the monopoly decides as to the kinds of wheat the miller must use and the proportions in which they are to be ground. This laboratory also does grading-analysis work on domestic wheats purchased by the monopoly. The grading system used is similar to that used in Sweden.

The monopoly purchases its supplies of foreign grain and flour direct from the exporter or his agent. In the case of flour imports, persons or companies who were formerly engaged in the flour-importing business are permitted to act as distributors or wholesalers at a fixed margin of profit. Agents for foreign mills are not permitted to act as distributors.

No imported flour may be sold under the brand name of the foreign mill producing it, but must be sold under one of the brand names designated by the monopoly. Seven brand types have been established for foreign flours and quality specifications have been formulated for each. The brands are as follows:

1. Patent Kanadisk hvetemel (Canadian patent)—ash content 0.48 percent; wet gluten 34 percent; water absorption 64 percent.
2. Almindelig, Kanadisk hvetemel (Canadian first clear)—ash content 0.60 percent; wet gluten 35 percent; water absorption 65 percent.
3. Blandingsmel, Kanadisk type No. 1 (Canadian second clear)—ash content 0.80 percent; wet gluten 38 percent; water absorption 65 percent.
4. Patent hvetemel, Buffalo formaling (Buffalo patent); ash content 0.46 percent; wet gluten 33 percent; water absorption 63 percent.
5. Vinterhete patent Amerikansk hvetemel (American hard winter patent); ash content 0.45 to 0.50 percent; wet gluten 30 percent; water absorption 62 percent.
6. Patent Engelsk hvetemel (English patent).
7. Almindelig Engelsk hvetemel (English first clear).

Since foreign flours are not permitted to be sold under the brand name of the foreign miller, the housewife and baker, when purchasing these flours, do not know whose product they are getting, and consequently give less consideration to these flours than formerly. On the other hand, the domestic miller is permitted to market this flour under his own name and, therefore, is enabled to build up trade on the basis of reputation for quality. This gives the domestic miller a decided advantage over his foreign competitor who must market his flour through a middleman and under a brand name which others may use.

Some people maintain that the monopoly is trying to build up the domestic milling industry by eliminating flour imports, but this is denied by officials of that organization. Even though the monopoly may have no intention of eliminating imports of flour, it is true that there has been a consistent downward tendency in flour importations during recent years. Flour import statistics of the 4 crop years beginning July 1, 1929, and ended June 30, 1933, show that during the first crop year of this period flour imports in terms of grain amounted to 3,282,000 bushels, the second year to 3,192,000 bushels, the third year to 3,259,000 bushels, and the fourth year to 2,616,000 bushels. This last represents a drop of more than 20 percent in flour imports from the 1929-30 crop year, and in 1933-34 to 1934-35 they averaged only a little more than 2,100,000 bushels.

Imports of flour from the United States have decreased more than those from other countries. One reason for this decline is that United States flour prices have for some time been above those of other exporting countries. This factor would not have had so serious an effect if these flours could have been sold under the brand name of the manufacturer, because with the high reputation for quality which some American flours have in Norway, a considerable portion of the trade would have continued to buy them regardless of the unfavorable price differential. English and Canadian flours do not have so good a reputation in Norway for quality as United States flours produced

at Buffalo mills. English flours in particular are considered to be inferior to Buffalo flours.

MILLING PRACTICES AND WHEAT PREFERENCES

According to a report issued by the State Grain Monopoly there were in Norway 968 mills on June 3, 1932, represented by 211 milling concerns. Most of these mills are of the grist-grinding type and are very small. Of the milling concerns operating on a commercial basis, 16 grind approximately 90 percent of all the flour milled. The principal commercial milling centers are Oslo and Bergen.

The commercial wheat mills operate almost entirely on foreign wheat, whereas the small gristmills usually grind only domestic grains—grists that the farmers bring to the miller for grinding. For grinding the farmer's grist of grain into flour the miller receives from the monopoly 3 kroner per 100 kg (17.04 cents per bushel at the average exchange rate for June 1933) and the farmer 1 kroner for each 100 kg (5.68 cents per bushel) of grain; for grinding whole grain meal the miller receives 1 kroner per 100 kg. The commercial mills receive their supplies of wheat from the State Grain Monopoly and must sell their products at the prices fixed by the monopoly. The prices at which the mills settle for their wheat supplies is determined by deducting from the fixed prices at which the mill products are sold a certain fixed grinding fee based on a 73-percent flour extraction. It is reported that Norway has sufficient milling capacity to mill all the flour needed for domestic consumption (table 43).

TABLE 43. *Commercial mill sales of flour and other mill products of Norwegian manufacture for the fiscal years 1930-31 and 1931-32*

Description	1930-31	1931-32
	7,000 pounds	1,000 pounds
Wheat flour, sifted, 73-percent extraction	150,824	157,102
Wheat flour, unbolted	19,791	31,575
Rye flour, sifted, 60-percent extraction	5,438	5,719
Rye flour, sifted, 65-percent extraction	25,234	3,319
Rye flour, sifted, 67-percent extraction	1,170	
Rye flour, unbolted	23,509	39,881
Blended sifted flour, 67-percent extraction rye (15 percent wheat, 85 percent rye flour)	210,555	209,596
Blended coarse flour unbolted (10 percent wheat, 90 percent rye)	3,194	7,640
Grits, 58-percent extraction	10,973	10,690
Grits, 70-percent extraction	8,152	6,201
Barley flour, 80-percent extraction for human consumption	1,582	1,761
Barley flour, unbolted	7,451	3,745
Groats	235	272
Semolina	67	116
Total	698,478	471,769

Statens Kornforretning, Beretning 4, fiscal year 1931-32.

At the prices at which the various foreign wheats were being offered in June 1933, officials of the monopoly stated that the most suitable milling mixture for the Norwegian trade is one consisting of Manitoba and Plate wheats in which the former represents from 40 to 50 percent of the mixture. The Manitobas used are chiefly of No. 2 grade. Some No. 3 and 4 grades of Manitoba wheats are also used. The type of Plate wheats most used is Barusso, chiefly because the Scandinavian countries have better shipping connections with Buenos

Aires, the port of shipment for this type, than with the other ports of Argentina. United States hard winters and Russian wheat are also suitable for milling mixtures when they can be bought at a price considered reasonable. If United States hard winter wheats were the cheapest wheat available, they could be utilized to the extent of 75 percent of the total foreign-wheat import requirements of Norway.

Hard winter wheat is considered superior in quality to most Plate wheats and more uniform in quality. Russian and Plate wheats are considered to be very variable in quality. It was stated that certificate final terms give a satisfactory basis for buying North American wheats.

The quantity of foreign wheat purchased by the State Grain Monopoly during the 1929-30 crop year amounted to 4,103,000 bushels; during the 1930-31 crop year to 5,149,000 bushels; and during the 1931-32 crop year to 5,649,000 bushels (table 44). Canadian and Russian wheats constituted more than two-thirds of the wheat purchased during the 1931-32 crop year.

TABLE 44.—Quantity and percentage of various types of foreign wheat purchased for use in Norway during the crop year 1931-32

Type of wheat	Quantity		Type of wheat	Quantity	
	1,000 bushels	Percent		1,000 bushels	Percent
Canadian hard red spring	2,213	39.71	Australian	294	5.20
Russian	1,580	27.97	United States hard red winter	18	.32
Argentinian	1,046	18.52	Total	5,649	100.00
Danubian	908	16.28			

Statens Kornforretning, Beretning, 3 fiscal year 1931-32.

Table 44 indicates, to some extent, the kinds of wheat suitable for the Norwegian trade, but the data presented must not be interpreted as representing the proportions in which these different wheats appear in the milling mixtures used. The proportionate quantity of each purchased was influenced to a considerable degree by its price relationship to other wheats. This relationship changes from time to time so that the proportions in which the various types of wheat are purchased also change, and milling mixtures must be varied accordingly. Moreover, some of the wheat purchased was for feeding, so it is possible that some of the types here mentioned may not have been used in milling blends for the production of flour.

BAKING PRACTICES AND BAKERY PRODUCTS

The Norwegian baking trade demands a very strong wheat flour of high diastatic activity. The wet-gluten content of these flours must be between 30 and 35 percent. The wheat breads produced are of excellent texture and quality. The pastries and cakes, similar to those made by Swedish bakers, are excellent in quality, and require a fairly strong flour such as the United States hard winter wheat flours.

As bakers are not permitted to begin work before 6 a. m., many bakers use automatic mixers like those found in German shops in order to produce fresh breads in time for breakfast. Wheat-flour

bread doughs are fermented for about 2½ hours. The Swedish practice of preparing the doughs the afternoon preceding the baking day and retarding fermentation during the night by chilling is not used in Norway.

The term "bread" in Norway means a bread product consisting of 20 to 45 percent of wheat flour and the remainder of rye flour; this is the type of bread most generally used. On June 9, 1933, the retail price in Oslo of this type was 36 ore for a 1-kg loaf (3.38 cents per pound). The retail price of wheat bread was 38 ore per ½-kg loaf (7.13 cents per pound) and 74 ore per 1-kg loaf (6.95 cents per pound). The sweet breads which are so popular in Sweden are not much used in Norway. Knackebrod, a sort of hard cracker made from rye meal, is very popular, as is flat bread, made in large thin sheets of waferlike appearance, with excellent keeping qualities.

DIETARY HABITS

Bread is a main article of diet among Norwegians. The chief kind used is the mixed rye and wheat flour bread previously described. One popular kind of bread that is apparently a specialty of the country is the so-called Swedish or Danish type. In many respects the eating and living habits of the Norwegian people are more nearly like those of the American people than are those of any other European people.

POLAND

Poland has a population of more than 33,000,000 and is 149,042 square miles in area, or slightly larger than the State of Montana. Rye, with a production more than three times that of wheat, is the grain principally used in the making of the common bread consumed here. Among city people the ordinary gray type of rye bread is usual while among the peasants the coarse black type made from whole rye meal is commonly used. Wheat bread and mixed wheat-and-rye bread are ordinarily considered luxury products which only the upper classes can afford.

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

During the pre-war period, 1909-13, wheat production in Poland (of present-day boundaries) averaged 61,665,000 bushels and rye production 224,836,000 bushels (tables 45 and 46). For a number of years after the World War, production of these grains was considerably below that of the pre-war period, but in more recent years it has averaged slightly above.

TABLE 45.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Poland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:													
1909-13			3,343			61,605	18.4						
1924-28			3,230			54,826	17.0	4,184	3,370	1,439	1,041	61,127	12.1
1929-33	3,763	345	4,108	60,282	6,870	72,152	17.6	506	31	1,834	822	70,122	12.2
Annual:													
1929	3,335	191	3,526	62,546	3,315	65,861	18.7	518	84	442	348		
1930	3,714	362	4,076	75,723	6,369	82,092	20.2	228	58	2,907	1,379		
1931	4,137	358	4,495	77,010	6,210	83,220	18.6	571	11	2,573	1,180		
1932	3,885	390	4,275	44,215	8,257	52,472	11.6	811	(*)	1,531	561		
1933	3,741	446	4,187	71,913	7,976	79,889	19.1	849		1,715	634		
1934	3,771	611	4,382	66,468	10,632	76,440	17.4	14	0	2,288	1,375		

¹ Year beginning July 1, except 1909-13, which begin Aug. 1.² Converted to grain on basis of 1.5 bushels of grain per barrel of flour.³ Stocks at the beginning and end of periods are disregarded.⁴ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 46.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Poland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	12,570	224,836	17.9				
1924-28	13,719	217,915	15.9	2,963	4,111	216,767	7.3
1929-33	14,276	258,680	18.1	213	14,318	244,555	7.7
Annual:							
1929	14,328	275,959	19.3	34	14,156		
1930	14,566	273,923	18.8	10	15,743		
1931	14,263	224,500	15.7	226	4,889		
1932	13,951	240,556	17.2	386	12,985		
1933	14,271	278,450	19.5	411	23,824		
1934	14,014	254,472	18.2	1	25,527		

¹ Year beginning July 1, with the exception of 1924, figures for which are on a calendar-year basis.² Stocks at the beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Production of rye has been fully ample for domestic consumptive requirements with some to spare for export; but, in the case of wheat, production in some years has been slightly deficient as regards quantity and considerably deficient in quality.

IMPORTS AND EXPORTS OF WHEAT AND RYE

As Poland did not exist as an independent nation in the years immediately preceding the World War, no import and export statistics are available for the pre-war period. The statistics presented are for the post-war period. For the 1924-28 period, total annual imports of wheat and wheat flour (in terms of wheat) averaged 7,554,000 bushels (table 45), whereas during the 1929-33 period they averaged only 626,000 bushels. On the other hand, total annual exports of wheat and flour during these periods averaged 1,253,000 and 2,656,000 bushels, respectively. In other words, Poland in recent years has shifted from a net importer of wheat to a net exporter. Net exports of rye during the period of 1924-28 averaged slightly more than 1,000,000 bushels annually but during the succeeding 5-year period they averaged in excess of 14,000,000 bushels annually—a substantial increase.

CHARACTERISTICS AND QUALITY OF POLISH WHEATS

Ninety percent or more of the wheat produced is winter grown. Spring wheat is grown usually only to replace winter-killed fall-sown wheat or to complete the wheat-seeding program begun in the fall.

Some of the winter wheats are of red color, but most of them are white. The white winter wheats predominate in the western, central, and northern portions of the country and red winter wheats in the southern and southeastern portions. The white winter wheats are of the long-kernel type with milling and baking properties about equal to those of United States soft white wheats. The red winter wheats range in hardness from soft to semihard. In quality they range from weak to medium strong.

The spring wheats are of the common species and are mostly red in color, with quality characteristics about the same as United States red spring wheat. Only an insignificant quantity of the durum species is produced.

Wheat variety-improvement work is carried on both by the State and by private individuals. The principal objective is to produce wheat varieties of superior yielding tendencies. To consistently yield well, a variety must either be resistant to rusts and other wheat diseases prevalent in Poland or be of such maturing habits as to avoid serious infection of some of these diseases. Improvement in quality is given only minor attention. Climatic and soil conditions are conducive neither to high yields nor to the production of high-quality wheat. The autumns are too dry and the springs and summers are usually too wet.

FOREIGN WHEAT REQUIREMENTS

Wheat production is usually equal to domestic requirements from a quantitative standpoint, but not from a qualitative standpoint. The domestic wheats are too weak in quality for the production of the luxury types of baked goods consumed. To provide flour of suitable quality for this purpose some foreign wheat or flour of good quality must be imported. If the importation is to be used by itself, United States wheat or flour of the ordinary hard winter export type is satisfactory, but if it is to be used with domestic wheat or flour, only importations of the highest quality are suitable. Thus in times like the present when foreign trade in wheat and flour is

much hampered by heavy duties and other drastic restrictions, imports are held to a minimum, which means that wheats of only high quality are wanted. If import restrictions were to slacken in all parts of the world so that Poland could dispose of some of its weak wheats in other countries, it in turn probably would be inclined to import more foreign wheat and flour. In that event, the quality demanded would not have to be so high.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

Ever since the war, the policy of the Polish Government in regard to agriculture has been distinctly protectionist. On November 4, 1919, a temporary customs tariff was enacted into law and became effective in January 1920. A second customs tariff was enacted on June 26, 1924, which remains as the basic tariff law. The agricultural items placed on the dutiable list by these acts included wheat and flour. Since the passage of the first tariff act in 1919, duties on wheat and flour have been changed frequently. The change has usually been upward.

A decree of December 29, 1931, effective January 1, 1932, announced that the existing world economic crisis had forced the Government to safeguard the vital interests of the country by imposing "temporary but absolute prohibitions" on the importation of certain goods or commodities, including cereals, flour, meals, and macaroni. This decree also announced that permits would have to be secured for the importation of any article, but that the absolute prohibition of the commodities referred to above would remain effective until conditions enabled the Government to establish import contingents for these commodities.

Since early in 1929 Poland has maintained a system of import certificates which provides for the issuance of "negotiable customs receipts" on the exports of certain commodities, including grain and flour. Because of the value placed on these receipts in connection with imports, they in reality constituted an export bounty.

For a number of years the Government has made purchases of domestic grain in order to control grain prices in favor of farmers. The Government was not only concerned with maintaining prices for domestic producers but also with insuring sufficient supplies for the home market. This policy eventually resulted in increasing production to such an extent that a large export surplus developed for rye. To correct this situation, the Government subsidized exportation of rye. This policy had such disastrous effects on the world price for rye that in 1930 an agreement was negotiated with Germany, Poland's chief rye competitor, for the establishment of a joint marketing organization to eliminate competition between the two countries for the European market. This or a similar agreement has been in effect ever since.

PORTUGAL

Portugal, with a population of approximately 6,000,000 people and an area of 35,582 square miles, produces most of its own wheat requirements and is generally on a self-sufficient basis of production for rye. The principal kind of bread used is made from wheat flour. Some rye bread is consumed, but only in a few of the Provinces is it of much importance. A considerable quantity of wheat is used in

the production of macaroni and similar alimentary pastes. The per-capita consumption of wheat and rye together is lower than in any other European country.

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Portugal for some time has been striving to become self-sufficient in wheat production and in the 1932 and 1934 crops it reached that goal. The attainment of this objective, however, has resulted in some sacrifice of bread quality. The 1934 crops of wheat and rye were reported at 20,503,000 and 4,802,000 bushels, respectively (tables 47 and 48). This wheat crop and that of 1932 were the two largest in recent years and possibly the two largest of all time. Average annual production of wheat in the pre-war period, 1909-13, was 11,850,000 bushels and of rye about 2,300,000 bushels, whereas production during the 5-year period 1929-33 averaged 15,540,000 bushels for wheat and 4,714,000 bushels for rye, representing increases from the pre-war period of 31 and 105 percent, respectively. Apparent annual consumption of wheat and rye in the 1909-13 period averaged 14,862,000 and 2,300,000 bushels, respectively. In the 1929-33 period apparent consumption of these grains had risen to 19,247,000 bushels for wheat and 4,714,000 bushels for rye. Production of both wheat and rye has about kept pace with consumption. Per-capita consumption of wheat shows a slight increase over pre-war times and for rye a very appreciable increase. The 1929-33 average per-capita consumption of wheat was 2.8 and of rye 0.7 bushels.

TABLE 47.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Portugal, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹		Exports ¹		Apparent utilization ³	
				Wheat	Flour ²	Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:									
1909-13	1,211	11,850	9.8	3,228	0	0	216	14,862	2.5
1924-28	1,661	16,121	9.5	6,172	485	0	3	16,775	2.6
1929-33	1,267	15,540	12.3	3,251	456	0	3	19,217	2.8
Annual:									
1929	1,075	10,814	10.1	5,420	330	0	11		
1930	1,101	15,817	12.5	5,423	401	0	1		
1931	1,271	12,969	10.2	2,845	618	0	1		
1932	1,461	23,791	16.3	1,914	592	0	1		
1933	1,121	16,281	11.4	658	398	0	0		
1934	1,458	20,503	14.1	591	270	0	0		

¹ Calendar year.

² Converted to grain on basis of 4.5 bushels of grain per barrel of flour.

³ Stocks at beginning and end of years are disregarded.

⁴ 1 year only.

⁵ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 48.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Portugal, average 1909-13, 1924-28, 1929-33, annual 1929-34*¹

Year	Acreage	Production	Yield per acre	Apparent utilization ²	
				Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	Bushels
Average:					
1909-13	321	3,300	8.5	(2,300)	0.4
1924-28	556	4,509	8.1	4,509	.7
1929-33	401	4,714	11.8	4,714	.7
Annual:					
1929	264	4,686	11.9		
1930	408	4,901	12.0		
1931	427	5,070	11.9		
1932	366	4,704	12.9		
1933	439	4,210	10.3		
1934	417	4,802	11.8		

¹ Only very small quantities of rye are imported or exported, not as much as 500 bushels in any 1 year.² Stocks at beginning and end of periods are disregarded.³ 3-year average.⁴ Unofficial estimate.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

IMPORTS AND EXPORTS OF WHEAT AND RYE

During the 5-year period, 1929-33, annual importations of wheat (inclusive of flour) averaged 3,710,000 bushels, only a small part of which was in the form of flour. This average was only about half of what it was during the preceding 5-year period. Exports of wheat, including flour, during the 1929-33 period averaged only 3,000 bushels annually. This average is about the same as that of the preceding 5-year period. These exports were almost exclusively of flour rather than grain.

Imports and exports of rye and rye flour have been of negligible proportions, usually amounting to less than 500 bushels yearly.

CHARACTERISTICS AND QUALITY OF PORTUGUESE WHEATS

The common wheats grown in Portugal are usually of a semihard texture and of medium baking quality. In physical appearance they somewhat resemble certain types of the United States Pacific coast wheats. Compared with German and French wheats, the Portuguese product is drier and harder. Between 65 and 75 percent of the domestic wheat is white and the remainder red. About 40 percent of the wheat is of hard texture. The durum and poulard types constitute the major portion of the hard wheats, and they usually occur mixed with each other or with wheat of the common type. They produce semolina of rather poor quality. Their principal use is in the production of bread flour, but when so used they are mixed with wheat of the common type.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

During recent years the duty on wheat has been fixed by special legislation. The quantity of wheat that may be imported and the periods when such imports may be made are regulated and controlled by the Government. Importation is not permitted into Portugal and the Azores excepting when a deficit occurs and a decree permitting entry is issued. Whenever the quantity that may be

imported is published, the Government at the same time announces the duty that must be paid on that particular quantity.

Flour millers have been obliged for several years to buy all of the domestic wheat offered by growers at prices fixed by the Government. The central feature of the Government's wheat price-fixing machinery has been its restriction of imports. The policy in this respect has been to regulate the importation of wheat in such a way that the public supply and the proper disposal of the domestic crop may not be endangered. As a rule the Government authorizes the importation of 80 percent of the estimated needs at the time of harvest in order that the foreign wheat may be available for mixing with the domestic product. The importation of the remaining 20 percent is permitted by December 31 of each year. The quantity of wheat that may be imported by each mill is fixed in accordance with its producing capacity. The importation of wheat flour is entirely prohibited in continental Portugal. In the Islands of Madeira and the Azores, however, flour may be imported from time to time by special authority of the central Government for each importation.

By a law of July 24, 1933, promulgating a code governing cereals and creating a National Federation of Producers of wheat the Government has rather far-reaching control of the marketing and processing of wheat. Open-market transactions in wheat are prohibited and such transactions as are permitted are limited to specified classes of producers and dealers. Producers are required to file yearly declarations setting forth their total crop. The marketing of domestic wheat is subject to a system of control by the Government. It stipulates that 32,000,000 kg of wheat shall be distributed monthly to millers. All transactions shall be governed by an established table of prices. The importation of foreign and colonial wheat is limited to such quantities as may be authorized by the Government subject to duties and certain specified restrictions and charges.

This law lays down regulations governing the milling industry; it prohibits the establishment of new plants, and provides for the closing of such plants as fail to operate during 120 working days per annum. It fixes milling quotas for each mill. It stipulates the kind of flour that can be produced and fixes a maximum price for the standard type of flour. It regulates the manufacture of biscuits and the grinding of cereals other than wheat. It empowers the Minister of Commerce to authorize the utilization of such cereals (of domestic production) as may be suitable for bread making. It provides that all bread made in Portugal shall be of a specified quality and that it shall be sold by weight in accordance with an established schedule of maximum retail prices. On February 2, 1934, a decree became effective which stipulated that flour intended for public consumption in Portugal and adjacent islands may not have an acidity content higher than 0.05 percent. The former acidity content limit was 0.06 percent in continental Portugal and 0.08 percent in adjacent islands.

There are approximately 375 mills, the total daily grinding capacity of which is about 5,000,000 kg (184,000 bushels of grain or roughly 40,000 barrels of flour). Approximately 300 of these mills are of low grinding capacity and in a great many instances are of the stone-burr type. Seventy-three of the mills, which number includes all the mills of much commercial importance and accounts for about 70 percent of the total output, belong to one or another of three groups.

One of the groups is a large incorporated company while the other two groups are associations or unions formed for the purpose of mutual benefit to their respective members. One large mill, Government-owned and operated, located at Lisbon, is not operated for commercial purposes, but is engaged only in the production of flour for use by the army and Government institutions. The Government also operates a large bakery in connection with this mill. The total milling capacity of Portuguese mills is said to be considerably in excess of domestic requirements.

All of the mills of any commercial importance employ the roller process of milling, and are equipped with about the same assortment of cleaning and milling machines as is found in roller mills of other European countries. A few of the larger mills maintain chemical laboratories for milling-control and experimental purposes, but as a rule chemical analyses play a very small part in Portuguese milling operations. Moisture and gluten are the only chemical factors that are considered of any importance. Bleaching and other chemical treatments for the improvement of flour color and quality are prohibited by law. A Government regulation limits the moisture content of flour to 15.0 percent.

Flour extractions are said to range from 75 to 80 percent. The Government has decreed that only a "straight" grade of flour may be made; nevertheless, some of the large mills are making a patent grade as well. When the importation of wheat is permitted, hard red winter, Manitoba, and Argentine types, with the exception of relatively small quantities of durum, are the only wheats in which the Portuguese millers are interested.

BAKING PRACTICES

Most of the bread used is baked in small bake shops. Bread bakeries of the factory type are found only in Lisbon and a few other of the largest cities. The baker sells his product direct to the consumer, the small baker at the place where he bakes and the large baker through sales shops located at various points over the territory in which he wants to distribute his product. The production of pastries and cakes is a separate industry. Bread prices are fixed by the Government. Night work in bakeries is prohibited by law. Biscuit consumption is relatively high.

The Government prescribes the quality of flour the baker can use and to some extent the kind of bread that can be baked. The breads are mainly of the French type with a firm crisp crust and porous texture but with a softer or spongier crumb. These breads are usually baked with yeast. When the writer was at Lisbon (November 1933) the quality of the bread being made was extremely poor. The crust was hard and of a blotchy pale color. The crumb was of a dirty grey color. Its cellular structure was very irregular with large open spaces or holes appearing under the top crust and in the middle of the loaves. Portuguese breads were of the poorest quality of any of the breads of Europe examined by the writer.

SPAIN

Spain has an area of 194,783 square miles (about three-fourths the size of the State of Texas) and has a population of approximately 24,500,000. The people consume large quantities of bread; among the lower classes it is the principal article of food. Bread production is almost exclusively from wheat flour, rye being but little used in bread making or as a human food. Rice and corn (maize) are of some importance as human food but not as bread. Use of corn for human purposes is confined principally to the northeastern and southern Provinces and is usually in the form of corn-meal porridge.

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Wheat production has shown a definite upward trend in recent years, while rye production has shown a downward trend (tables 49 and 50). During the pre-war period, 1909-13, annual production of these grains averaged 130,446,000 and 27,636,000 bushels, respectively, whereas during the 1929-33 period the corresponding production averages of these grains were 151,563,000 and 22,437,000. Thus, in the case of wheat, production since pre-war times has increased 16.2 percent, whereas in the case of rye it has decreased 18.8 percent. These trends in production also continued through the 1934 harvest, which yielded 173,600,000 bushels of wheat and 22,176,000 bushels of rye.

TABLE 49.—Average, production, yield per acre, trade, and apparent utilization of wheat in Spain, average 1909-13, 1924-28, 1929-33, annual 1929-34

Year	Area acre	Production bushels	Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
				Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	
Average			Bushels	bushels	bushels	bushels	bushels	bushels	Bushels
1909-13	9,547	130,446	13.7	46,049		171		130,381	6.8
1924-28	10,655	139,687	13.1	5,197		6	621	143,257	6.3
1929-33	11,083	151,563	13.7	3,135		6	96	151,466	6.5
Annual:									
1929	10,622	151,215	14.5	1,959	0	19	169		
1930	11,133	146,700	13.2	13	0	9	160		
1931	11,215	131,427	12.0	2,539	0	2	53		
1932	11,218	181,207	16.1	8,284	0		20		
1933	11,168	138,235	12.4		0	1	76		
1934	11,161	173,600	15.6				2		

¹ Year beginning July 1.

² Converted to grain on the basis of 4.5 bushels per 1,000 of 196 pounds.

³ Stocks at beginning and end of periods are disregarded.

⁴ Includes flour.

⁵ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 50.—*Acreage, production, yield per acre, and apparent utilization of rye in Spain, average 1909-13, 1924-28, 1929-33, annual 1929-34*¹

Year	Acreage	Production	Yield per acre	Apparent utilization ²	
				Total	Per capita
Average:					
1909-13	1,988	27,636	13.9	27,636	1.1
1924-28	1,777	21,516	12.8	21,516	1.1
1929-33	1,512	22,137	14.8	22,137	1.4
Annual:					
1929	1,519	22,935	15.1		
1930	1,551	21,513	13.9		
1931	1,516	21,102	13.9		
1932	1,516	25,995	17.1		
1933	1,460	20,702	14.2		
1934	1,151	22,176	19.3		

¹ Only very small quantities of rye are exported or imported by Spain.

² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agriculture Service, Division from official records, and from publications of the International Institute of Agriculture.

Wheat production usually has been somewhat short of domestic consumption. During the pre-war period, 1909-13, this deficit averaged about 6,000,000 bushels annually. Since then crop deficits have shown a marked tendency to shrink. In the 5-year period, 1929-33, crop deficits averaged only about 3,000,000 bushels, while in the 1934 crop which followed this period there was a production surplus.

Rye consumption apparently varies with production because no matter how poor or how good the domestic crop happened to be, the quantity of this grain imported or exported in any year was never large.

IMPORTS AND EXPORTS OF WHEATS

Because Spain is on the border line of self-sufficiency in wheat and because that country has no large export trade in wheat or flour, imports of these commodities fluctuate considerably from year to year. In years of high domestic production, imports naturally have been less than in years of low production. Within recent years annual imports have ranged from zero up to 20,500,000 bushels (1920-21). In the years when importations have occurred, nearly the whole of these imports have been of wheat grain. Wheat flour usually accounts for a very small part of the imports.

In pre-war times the chief source of supply of wheat imports was Russia. During the war and part of the period since the war the United States and Argentina have been the chief sources of supply.

CHARACTERISTICS AND QUALITY OF SPANISH WHEATS

According to information furnished by the Instituto Cerealicultura La Moncloa, Madrid, 20 percent of the wheat produced in Spain is durum, 25 percent common red, 50 percent common white, and about 5 percent spelt, emmer, poulard, and Einkorn. Of the common red wheats about four-fifths are of hard texture and one-fifth of soft texture, and of the common white wheats 5 percent are of hard texture and 95 percent of soft texture. The principal areas of production for durum wheat are the southern and southeastern portions of the country. The common red wheats are grown chiefly in the north-

eastern sections and to some extent in the extreme northwestern part of the country. Common white wheats are produced in practically all sections but the principal area for its production is the central and west-central portion of the country. The production of the spelt, emmer, poulard, and einkorn species of wheat is chiefly confined to the mountainous regions of northern Spain.

Durum wheats are said to do best only in the hottest sections where the weather is humid or on irrigated land. This type of wheat does not do well in the sections of high altitude where cool nights prevail. One of the principal varieties of durum wheat produced is *Fastuosum*. The kernels of this variety are very long and resemble the so-called "Wild Goose" wheat. Much of the durum wheat produced is of good amber appearance and, no doubt, is suitable for the production of semolina for use in making macaroni. The production of durum is said to be decreasing.

Most of the wheat is fall-sown (November and December). In some parts of the country, seeding is done in rows about 15 inches apart and the plants are cultivated. It is claimed that by this method the weeds can be kept under control, the moisture conserved, and the fertility of the soil utilized to a much greater extent. Much of the harvesting and threshing of cereal grains is done by hand; in fact, in the threshing of wheat it is said that only 2 percent of the farmers use the machine method, but that these farmers, because they are the larger wheat producers, account for about 5 percent of the total production.

The Government maintains agencies for conducting wheat-breeding and cultural experiments and for seed-testing and distribution purposes. The aims are to increase the profitableness of wheat farming, to raise wheat production to a self-sufficiency basis, and to improve the quality of domestic wheats. Officials engaged in this work say that Manitoba wheat possesses the qualities most desirable for Spanish domestic consumption and represents the standard of quality they are striving for in domestic production. Experiments have been conducted with the best-quality United States and Canadian varieties, but none of these have produced wheat of satisfactory quality when grown in Spain. The most satisfactory wheats thus far produced are of the hard red winter type, but even these lack the full measure of quality desired.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

Much legislation enacted in recent years, primarily to improve the agricultural and economic situation of the country, has affected the milling and grain industries. Under the authority granted by this legislation the Government fixed minimum prices to be paid the farmer for wheat; regulated bread and flour prices; prohibited the importation of wheat until domestic prices reached a determined level; put duties on imports; introduced a milling regulation obliging millers to use a fixed percentage of domestic wheat in the milling of flour; regulated the interior supply conditions by obliging the wheat trade and the farmers to submit regular accounts of all transactions in wheat including stocks, purchases, and prices; and granted special credits to farmers for the acquisition of selected seed. These measures and regulations did not all go into effect at the same time, but were adopted at various times and modified in various ways to fit changing conditions.

MILLING PRACTICES

The most important milling centers are Barcelona and Bilbao. Some large mills of the modern type are situated at these and a few other points, but in most sections of the country the mills are small and of an antiquated type (fig. 23). Stone buhrs for grinding the grain into flour are still used in most of the small mills. Many of these mills are operated in connection with bakeries, not as commercial mills but for supplying the bakeries with the flour they need. At some of these plants, it is the custom to grind each day the flour needed for the next day's baking. These mills use only domestic wheats.

In the large mills only the roller process of milling is found. In some of these the system of milling employed is similar to that employed in English mills, while in others it is similar to that employed in German mills. The milling equipment is of English, German,

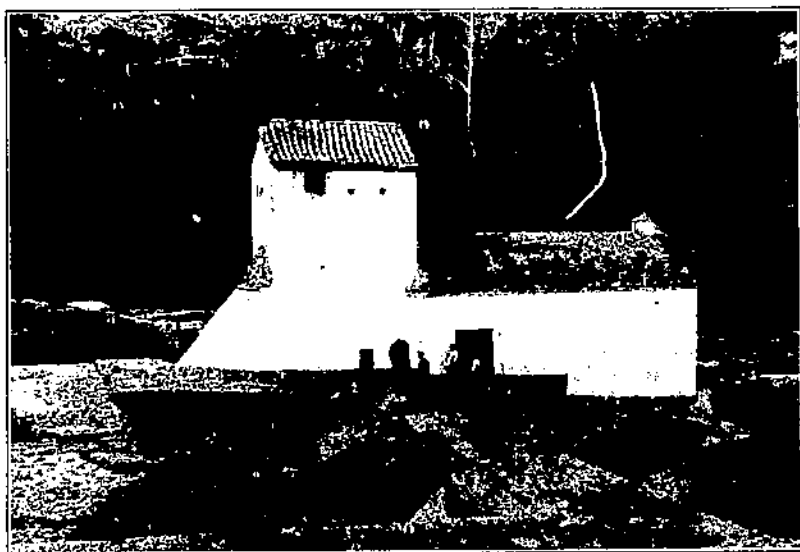


FIGURE 23. Water-power mill near Sevilla, Spain, grinding with stone buhrs. In interior country sections of Spain the stone-buhr method of milling still flourishes. The modern-type mill is chiefly found at seaports and in the principal interior cities.

Swiss, and Italian manufacture. The large mills are equipped with wheat washers primarily for use in washing foreign wheats. Some of the millers claim that domestic wheats will not stand washing. The large mills maintain laboratories for milling-control purposes, but they are not very well equipped and the testing work is usually of a very simple character. The bleaching of flour is not prohibited, but only a little bleaching is done because the baking trade attaches small importance to the whiteness of the flour.

The combined milling capacity of Spanish mills is more than sufficient for the production of all the flour needed for domestic consumption. One miller stated that it was more than double the actual requirements. The flour-extraction percentage to which wheats are milled is relatively high, ranging from 75 to 80 percent in the large mills. As a general rule millers mill to an extraction percentage equal

to the kilogram-per-hectoliter weight of the wheat. Three grades of flour are generally produced by the larger mills of Spain, as follows:

Quality	Beginning and end points of extraction (percent)
Patent	0 to 16
Bakers	16 to 65
Low grade	65 to 75

The patent grade of flour, which is generally of coarse granulation, is used in the production of luxury breads and pastries. The bakers' grade is used in the production of ordinary breads, and the low-grade flour in the production of cheap bread for miners and other low-paid laborers.

A desirable mixture of wheat for milling purposes contains 20 percent of hard red winter or Manitoba with 80 percent of domestic wheat of the Condal type (a white wheat). Manitoba wheat is generally considered the most suitable type for blending, with the domestic wheats and United States hard winters the second most suitable. The better quality high-test-weight wheats, Bahia Blanca and Rosafe, from Argentina are also considered to be suitable for milling purposes. Australian wheats are sometimes used but are not considered so suitable. United States Pacific coast wheats are not liked; the white wheats are considered too soft while the hard red winter wheats are deficient in the desired gluten characteristics.

A considerable quantity of durum wheat, of domestic production only, is used in making bread flour, but such milling is confined almost wholly to those sections in which the durum is produced. Although the domestic durum wheat appears to be well suited to the production of semolina for macaroni making, comparatively little of it is so used because there is no considerable consumption of macaroni and other alimentary pastes.

BAKING PRACTICES

Most of the bread consumed is produced in bakeries of the shop type, a large majority of which do not produce more than 300 kg of bread per day. There are only four or five bakeries of the factory type in the whole country. In a great majority of the bakeries, including factory as well as the shop type, the so-called Roman type or hearth-fired oven is used. In the larger cities many of the smaller shops make only rolls and fancy breads; the ordinary breads they sell are obtained from the larger bake shops. In addition to supplying the smaller bakeries with ordinary breads, the large bakeries maintain a number of sales shops of their own to distribute their products and in some sections they maintain a door-to-door distribution service.

The most common bread baked, and that generally eaten by the poorer classes, is close-grained and dry and has a hard, smooth, pale-colored crust. It is of excellent flavor, but because of its dryness and compactness not much can be eaten at a time without the use of some liquid. In some instances this bread is made from flour milled from common wheat, but usually is made from durum wheat flour. It is baked in various sizes and shapes, though the most common shape is one resembling a crown and is called "Pan sobao."

The upper classes prefer breads or rolls of the Vienna or French type which have a coarse texture and a crisp crust. A considerable quantity of this type is produced in the cities but not much in the

rural sections. It is principally in the form of rolls and is milled from wheat of the common species. It sells at a higher price than the other type of bread, but in spite of this fact its use is increasing.

All bread, except a small percentage used for sandwich purposes, is hearth baked. It is reported that night work in bakeries is prohibited; nevertheless some of the employees work up to 11 p. m. preparing for the next day's bake and others are on hand at 4 a. m. to begin mixing the doughs. In general, however, bakers conform to the 8-hour work-day principle.

The consumer demands fresh bread, and the baker tries to meet this demand. Stale bread does not find ready sale; some is used for toast, but many shops sell left-over or stale bread for animal feed. The price at which common or ordinary breads may be sold is fixed by the local Government. The following prices were in effect in Madrid on November 26, 1933: Common bread—0.60 pesetas per kilogram for sizes of 1 kg or more and 0.33 pesetas for $\frac{1}{2}$ -kg size (3.51 and 3.86 cents per pound, respectively, at current rates); luxury bread (of which practically all is in the form of rolls)— $\frac{1}{10}$ - to $\frac{1}{4}$ -kg size—0.12 pesetas apiece (1.55 cents).

DIETARY HABITS

The Spanish people are inclined to much leisure, especially in connection with their meals. They begin the day with a very light breakfast. At 12:30 p. m. all commercial and industrial activity ceases for 2 hours while the people have their midday meal. Stores, shops, offices, and places of entertainment are closed during this period. Restaurants and cafes are the only places of business that remain open. For the upper class of people this meal is generally rather elaborate. Work is resumed at 2:30 p. m. and for many people lasts until 7 to 8 p. m. Most stores are open until 8 o'clock. From 8 to 10 p. m. an elaborate evening meal is served. Places of amusement are closed during this period but they open at 10 p. m. when life on the streets again returns to normal activity until midnight or later.

Bread is an important article of food at all meals among all classes of people. In the poor man's diet it is the principal item. In the middle- and upper-class man's diet, bread or rolls, although not always the main item, are nevertheless important in most of the courses of each meal. Olives and olive oil also are important in the dietary habits of the people. On the city streets pickled olives are sold in paper pokes and are eaten in public. The midday and evening meals served at hotels are usually of 7 courses consisting of soup, fish, a salad, two kinds of meat each with vegetables, a pudding dessert with cakes or pastries, and fruit with nuts or figs. Bread or rolls are served with all courses except the last two. The evening meal at hotels is seldom served before 9 p. m.

Among the common people the various meals are about as follows: Breakfast consists of coffee and dry toast or bread. The midday meal consists of boiled potatoes, eggs, a small piece of meat or fish, plenty of bread, and a portion of wine. In some homes coffee is served after this meal, but as a general practice the working people go to a cafe for their midday cup of coffee. The coffee served at home is usually inferior in quality and is sometimes called "chestnut water." The evening meal is generally a stew consisting of green

beans, potatoes, pumpkin, and chick peas, boiled with Spanish sausage and another meat, but this meat is removed from the stew when the cooking is done and is served as a separate course. Bread, wine, and coffee constitute a part of this meal.

SWEDEN

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

Sweden has a population of approximately 6,250,000 people (1934) and an area of 173,035 square miles or is about the size of the combined areas of New York, Pennsylvania, Ohio, and Indiana. The climate is not especially favorable to the production of grain on account of the shortness of the growing season and the wetness at harvest time. Notwithstanding these disadvantages, production of wheat and rye in recent years, has exceeded domestic quantitative requirements.

Prior to the World War, rye production was approximately three times greater than wheat production; but since the war rye production has decreased, whereas wheat production has increased, so that at present the wheat production is by far the greater (tables 51 and 52). In 1934 the wheat crop amounted to 28,376,000 bushels, second to the record outturn of 1933, while rye production amounted to 20,673,000 bushels. Comparing the average annual production for the 5-year period 1929-33 with that for the 5-year period 1909-13, wheat has increased 178 percent, whereas rye has decreased 34.

TABLE 51.—Acreage, production, yield per acre, trade, and apparent utilization of wheat in Sweden, average 1909-13, 1924-28, 1929-33, annual 1929-34

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ²	Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bu.	1,000 bu.	1,000 bu.		1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	Bu.
Average:							Bu.						
1909-13.....	361	73	437	11,349	1,611	13,193	31.8	47,080		122		15,160	2.7
1924-28.....	513	147	660	18,615	3,808	22,513	32.0	5,128	242	408	40	21,095	3.5
1929-33.....	552	163	719	23,724	4,632	28,376	39.5	1,726	6	3,130	1		
Annual:													
1929.....	482	92	571	16,097	2,404	18,011	33.1	5,431	878	1,929	218		
1930.....	530	110	646	17,006	2,823	20,819	32.2	5,275	208	62	11		
1931.....	632	151	783	13,565	3,528	17,033	24.9	6,517	89	19	(³)		
1932.....	577	160	740	21,611	4,880	26,500	35.6	3,018	22	23	(³)		
1933.....	592	207	799	23,506	6,628	30,204	39.6	1,709	13	14	(³)		
1934.....	555	163	719	23,724	4,632	28,376	39.5	1,726	6	3,130	1		

¹ Year beginning July 1, except 1909-13, which begin Aug. 1.

² Converted to grain on basis of 4.5 bushels of grain per barrel of flour.

³ Stocks at the beginning and end of periods are disregarded.

⁴ Includes flour in terms of grain.

⁵ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 52.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Sweden, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13.	977	21,160	21.7	3,000	50	27,981	6.0
1924-28.	715	18,544	21.9	3,120	533	21,137	5.5
1929-33.	560	15,952	28.5	1,609	12	17,579	2.0
Annual:							
1929.	693	16,208	25.6	4,225	10		
1930.	606	17,182	28.5	1,151	20		
1931.	511	14,196	21.8	2,188	50		
1932.	516	17,004	33.1	739	52		
1933.	510	18,128	34.2	61	37		
1934.	583	20,673	34.6				

¹ Year beginning July 1, except 1909-13, which begin Aug. 1; flour included, converted on the basis of 4 bushels of grain per barrel of flour.

² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

Annual apparent consumption of wheat and rye, figured on the basis of production plus net imports, or minus net exports, as the case may be, with carry-overs disregarded, averaged during the two 5-year periods 1909-13 and 1929-33 for wheat 15,160,000 and 27,429,000 bushels, respectively, and for rye 27,981,000 and 17,579,000 bushels, respectively. This shows the same reversal of form as production. Comparing the 1929-33 average annual consumption figures with 1934 production, it is evident that Sweden has now reached a self-sufficient basis of production.

CHARACTERISTICS AND QUALITY OF SWEDISH WHEATS

The wheats are of the so-called common type or species, red in color, and mostly of winter habit. In 1913, 95.6 percent of the total production was of winter wheat and 4.4 percent of spring wheat. Since then the percentage of spring wheat has steadily increased until, in the 1933 crop, it constituted 19.5 percent of the total. The spring wheats are of harder texture and usually of better quality and higher protein content than the winter wheats. According to official information there has been considerable improvement in the protein content of winter wheat since the 1930 crop. This improvement has been due chiefly to the substitution of winter varieties of better quality for the English squarehead varieties which had been grown in years past. Improvement in the spring wheats grown has not been so marked. It is reported that from 70 to 80 percent of the spring wheat produced is of the Diamant variety.

The spring wheats are semihard to hard in texture, but most of the winter wheats are of the soft type. Some hard winter varieties have been grown but they have not been successful. The work of improving the quality of the wheats is in the hands of private enterprise supported in part by governmental appropriations. Usually the best-quality wheats are produced in the middle sections of Sweden; but it is reported that in 1932 the best wheats were produced in the southern part, some of these containing, it is said, as much as

11.2 percent of protein (13.5 percent moisture basis). Since mostly winter wheats are produced in this section, this occurrence was the more remarkable.

The moisture content of Swedish wheat and rye is usually high, ranging from about 15 to 22 percent. In the best years, it averages about 16.5 percent and in the worst years in the neighborhood of 18 percent. These high moisture contents are caused by the wet weather which generally prevails at harvest time which in turn results in a considerable percentage of sprouted kernels. It has been reported that, because of the presence of germinated kernels and the spoilage due to excessive moisture, about 20 percent of the crop is ordinarily unsuitable for milling. In the crops of 1932, 1933, and 1934, however, there was practically no damage of a nature that would make the grain unsuitable for milling purposes.

The grain is usually fairly clean and of low foreign-matter content—much lower than with some of the United States wheats. Garlic occurs only in the wheats produced on Gotland Island. The 1932, 1933, and 1934 crops of wheat and rye were not only unusually large but also superior to the usual run of crops in quality, soundness, and natural weight. Several millers and cereal chemists reported that these were the best crops within their experience. In general, however, the quality of Swedish wheats is poor. They are low in gluten content and the gluten is of poor quality, which is said to be caused by an excess of gliadin. They are high in diastatic activity and are therefore of high gassing power. In many cases, especially in normal crop years, the diastatic activity is too high for satisfactory baking results. The addition of foreign wheats is necessary in the milling mixture not only for the purpose of adding to the gluten content and quality of the resultant flour, but for lowering diastatic activity as well.

The flours milled from Swedish wheats are of low water-absorbing capacity and when baked into bread they yield loaves of low volume. Table 53 gives data furnished by Dr. Hagberg, one of the leading milling engineer chemists of Sweden, showing the water absorption percentages and the loaf volumes obtained with wheat flours milled from Swedish, Manitoba, and Barusso wheats of various grade types. These data show that there is a considerable range in water absorption for the various classes of wheats and in the loaf volume of the bread made from the respective flours. Among the Swedish samples tested, the spring wheats showed a marked superiority over the winter wheats, but both classes generally showed an inferiority to the other wheats, especially in loaf volume.

TABLE 53.—*Water absorption, bread and volume yield of different types of wheat*

(Flours milled to 60-percent extraction on an experimental mill)

Wheat type and quality grade	Water absorption of flour ¹	Loaf volume	
		Per 100 g of flour	Per pound of flour ²
	Percent	Cubic centimeters	Cubic inches
Manitoba:			
Good	62.5	1,000	276.69
Normal	59.0	880	231.35
Poor...	51.0	700	193.68
Danisco:			
Good	57.0	900	212.62
Normal	71.0	770	207.52
Poor	51.2	600	165.07
Swedish spring wheat:			
Good	57.0	800	221.45
Normal	52.5	680	166.01
Poor	47.5	500	138.81
Swedish winter wheat:			
Good	52.5	650	179.85
Normal	50.0	630	170.85
Poor...	41.6	430	121.51

¹ Based on 15-percent moisture content of flour.² Pounds avoirdupois.

Hagberg (%).

In physical appearance the Swedish spring wheats resemble the Preston or Bluestem spring wheat varieties as grown in the United States. They range in color or vitreous appearance from starchy to dark but are more often starchy or mottled than dark. In kernel texture they are somewhat softer than United States spring wheats and in baking strength are about on a par with United States wheats of the red spring subclass and the poorer types of the northern spring subclass. The winter wheats resemble the red winters of the Eastern States and are probably of similar quality. The spring wheats are the most desirable for bread flours, usually command a premium over the winter wheats, and in many instances are marketed on a protein-content basis. The winter wheats are well suited for pastry and cake flours of the kind made in the United States, but are considered too weak for the particular type of pastry products made in Sweden and other Scandinavian countries.

GOVERNMENT REGULATIONS AFFECTING THE GRAIN AND MILLING INDUSTRIES

Through the enactment of certain legislative measures in 1930 the Government definitely committed itself to a policy of aiding the agricultural industry. An order was published on June 13, 1930, the object of which was to assist the farmers in the marketing of their wheat and rye by requiring that all millers milling foreign rye or wheat (except for macaroni purposes) must use a certain percentage of domestic grain and that all imported flours (except those for macaroni purposes) must contain a certain percentage of Swedish flour when sold. The percentages are fixed in accordance with the size and suitability of the crop and usually apply to periods for a month or two at a time.

In addition to fixing milling percentages, an association of Swedish flour millers was formed in 1931 called the "Svenska Spannmålsföreningen" or Swedish Millers Association which has a State import

monopoly and the right to impose a levy on imports as a means of covering its costs of operation and any losses it may suffer. It was granted its import powers in return for undertaking the responsibility of purchasing all surplus grain remaining in the country during the period June 1 to July 31, 1931, on a basis of a minimum price fixed by the Government. This scheme which has been in operation continuously since its inception, includes the provision that during the period mentioned mills can purchase their supplies of wheat only through this association. It is of interest that the minimum price effective for June 1 is increased by 1 öre per 100 kg (0.07 cent a bushel at current exchange) each day thereafter during the 2-month period designated in which the association must buy the remaining stocks of domestic wheat and rye.

No minimum prices were fixed at which millers are required to make their purchases either during the period August 31 to May 31, when they are permitted to buy direct from the producer, or during the period when their purchases must be made from the Swedish Millers' Association; neither is the miller required to buy by grade. The compulsory use of Swedish grain and the fixed minimum price which the farmer knows he can get for his grain on and after June 1, forces the miller, however, to pay prices somewhat in line with the June 1 minimum price. Another factor which helps in this direction is the enactment of certain regulations providing facilities for the storage and financing of grain so that the farmer is able to retain ownership of his crop until June 1. The scheme has been continued ever since its adoption and apparently has been operating successfully. Greater leniency in the matter of percentages of foreign grain is shown to association members than to others, but in return these members are obliged to store certain specified quantities of grain for farmers at charges fixed by the Government.

MILLING PRACTICES

There are approximately 80 mills of the modern type and approximately 4,000 old-time mills of the windmill type. The grinding capacity of the former ranges from 100 to 2,000 barrels of flour per 24 hours. The mills of the windmill type are of low grinding capacity and operate on a grist-grinding basis. Their business is chiefly that of grinding feed for farmers. They make some whole-meal flour, usually from rye. Practically all the commercial milling is done by the modern mills. Some of these operate solely on wheat and some solely on rye. In the case of wheat milling their production constitutes about 95 percent of the total flour production of the country, and in the case of rye milling, about 80 percent. According to data contained in an official Swedish bulletin, the quantities of various sorts of flour and meals produced in 1931 by Swedish mills were as follows:

	<i>500 pounds</i>		<i>100 pounds</i>
Wheat flour	6, 212, 717	Rice meal	8, 818
Rye flour	2, 923, 917	Corn meal	283, 247
Barley flour	36, 111	Other meals	5, 445
Oatmeal	78, 043		

The two largest mills are operated by a cooperative association—one is located at Göteborg and the other at Stockholm. The largest incorporated milling company of the country operates seven large

mills and is said to mill about one-fourth of the total production of flour. All the large mills are located at seaport towns and have modern facilities for receiving grain from ocean-going vessels (fig. 24).

The grain-storage facilities at the large mills are of the modern bulk type. In some instances the storage space in relation to grinding capacity is comparable with that of the United States mills, but in most instances it is relatively lower. Figures are presented in table 54 which show the storage space in comparison with grinding capacities for three of the better mills. These figures are no doubt considerably higher than the general average.

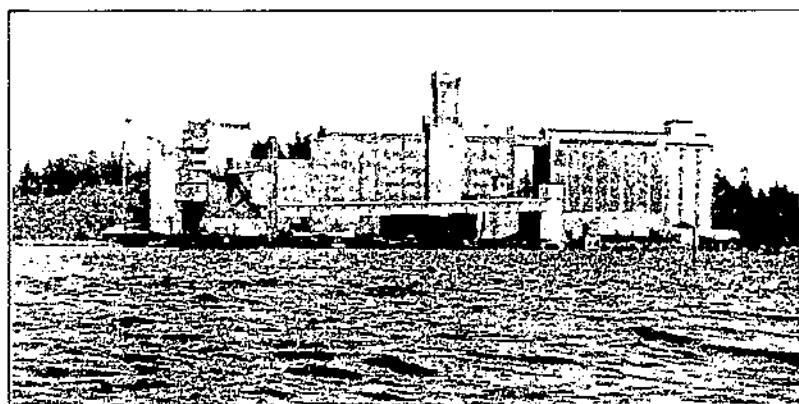


FIGURE 24. Mill near Norköping, with modern shipping and receiving facilities. In equipment and technique of operation the mills of Sweden are among the best in the world.

TABLE 54.—Comparison of grain-storage and grinding capacities of three Swedish mills

Mill designation	Grinding capacity per day		Grain-storage capacity
	Wheat flour	Rye flour	
	Bushels	Bushels	Bushels
No. 1	2,000	500	350,000
No. 2	1,100	400	120,000
No. 3	1,150	400	180,000

¹ Also has port silos of 5,000-bushel capacity, and some country elevators.

² Includes space for 20,000 bushels of rye.

The equipment of the larger mills is as up to date and complete as that found anywhere in the world. All have wheat washers and conditioners and are fully equipped to remove foreign matter of any kind from the wheat or rye they mill.

The laboratories in some of the larger mills are of the best to be found anywhere. Swedish mills were among the first to establish cereal-testing laboratories for milling-control and experimental purposes and nowhere does the cereal chemist play a more important part in mill operation than in Sweden. In several of the largest mills the chemist superintends the operation of the mill as well as his laboratory. In the laboratory control work protein content of the

wheat is given much more consideration than at mills in most other European countries.

Swedish mills use a much greater linear extent of grinding surface than do United States mills. A miller in one of the large mills reported that in the milling of wheat he was using 65 mm of grinding surface per 100 kg of grain-grinding capacity and in the milling of rye 45 mm. Based on flour extraction of 74 percent for wheat and 72 for rye these dimensions, if converted into inches per barrel of flour production, would be 3.08 and 2.19, respectively. United States mills sometimes operate on as little as 1 inch of grinding surface per barrel of flour. The use by Swedish millers of so much grinding surface (and the same is generally true for other European millers) is attributed to the wider variation in kernel texture and other physical characteristics of the wheats they grind and to the necessity for producing flour of longer extraction. The wheats in the milling mixture of the United States millers are usually all of one class or of classes that are somewhat similar in physical type and relative hardness. The European millers' milling mixture usually consists of several types of wheat ranging from extreme softness to extreme hardness; such mixtures require a more gradual and careful breaking and reduction of stock, and, incidentally, more grinding surface, in order to obtain a clean and complete separation of flour from bran.

With respect to milling yields and flour-extraction percentage, a miller at one of the largest mills reported the following as being typical of his mill and somewhat representative of other large Swedish mills as well:

<i>Wheat milling yields</i>		<i>Rye milling yields</i>	
	<i>Pound</i>		<i>Percent</i>
Patent flour	65.0	Flour of best quality	52.2
Clear flour	5.8	Flour of second quality	19.9
Low grade flour	3.3		
Total flour	74.1	Total flour	72.1
Middlings	1.6	Offals	25.8
Bran	21.6	Total of products	97.9
Total of products	100.3	Milling loss	2.1
Milling gain	.3		

Swedish mills are equipped with machines of German manufacture and they use the German system of milling. One outstanding difference between this and the United States system is the greater number of sizing reductions used in the former. Most German and Swedish mills employ five to seven sizing operations whereas United States mills employ from one to three. Several of the sizing operations in Swedish and German mills are, however, on clean middlings stock, which the United States miller is accustomed to reduce to flour without subjecting it to an intermediate reducing operation. Compared with the system of milling used in English mills, Swedish mills use sifters more extensively for stock separations. In England some sifters are used on the coarse and granular stocks at the head end of the milling process, but on the softer stocks resulting from grindings at the intermediate and tail-end stages of the process the reel type of separator is used.

The cleaning equipment consists of a wide assortment of devices which collectively are capable of separating practically all the various sorts of foreign material found in wheat. As a general practice foreign and domestic wheats are washed and cleaned separately and in some instances are ground separately. The washing process, in addition to removing smut and other dirty matter from the surface of the kernel, and removing the stones, grit, or sand that may be present, functions as the means for raising the moisture content of the wheat to the percentage desired for milling purposes.

To control the quantity of moisture present in the wheat at the time of grinding requires regulation of the washing and drying processes. Wheats of low moisture content or hard texture are given a longer immersion in the wash water and are subjected to less drying than are the softer or damper wheats.

The grades of flour produced by the larger mills are somewhat similar to those produced by United States mills. For mills operating on mixtures consisting of 12 percent of foreign wheat and 88 percent of domestic wheat, the various grades of flour produced are about as follows:

	<i>Heating and end points of extraction (per cent)</i>
Short patent	0 to 45
Long patent	0 to 65
Straight	0 to 74
Clear	50 to 74
Low grade	70 to 74
Bakers	clear combined with straight

According to information furnished by a leading Swedish miller, approximately 85 percent of the short patent flour sold is for household use, and 15 percent is for commercial bakery use in the making of pastries. Sixty percent of the long patent flour sold is for household use and 40 percent for commercial baking. The straight and baker's grades are used only by bakers for bread purposes. Clear and low-grade flour is mixed with rye flour for bread making. Clear flour is used with the lighter types of rye flour, and low-grade only with the dark or inferior types of rye flour.

The small mills usually make only a straight grade flour. If a patent grade is made, it is usually of long, rather than short, extraction. The various grades of flour milled by these mills are used for about the same purposes as those milled from wheat mixtures containing foreign flours, but they are sold to a less particular class of trade except that some is used in making a special type of knäckebröd.

As a general rule, housewives want short patent flours, biscuit manufacturers want both short and long patents, and bread bakers want clears, straights, and stuffed straights.

Rye is milled to a higher percentage extraction than in Germany despite the fact that Swedish people prefer rye bread of lighter color than do the German people. The desired lightness of color is obtained by the admixture of wheat flour.

WHEAT-MIXING PRACTICES

In former years, before the Government adopted measures for the protection of the agricultural industry, the large mills used domestic wheats but sparingly, their mixtures containing chiefly foreign wheats.

A considerable quantity of domestic wheat was exported and a considerable quantity was used for feed. Under present regulations, however, which limit the quantity of foreign wheat and flour that may be used and which maintain a price level for domestic wheat considerably higher than the world prices, this order of things has been changed. Less domestic wheat is being used for feed, and very little is being exported.

The trade requirements have always been for a good quality of flour, and to fulfill these requirements in past years the millers have considered it necessary to use a high proportion of the strong wheats in their milling mixture. Canadian, Russian, Argentine, and United States hard wheats have been used in various proportions and combinations together with domestic wheat. Foreign wheats of the soft type were little used. As long as there were no import and milling restrictions, the price was an important factor in the choosing of the wheats to be used, but with the restrictions now placed on import wheat, only the very strongest foreign wheats obtainable are purchased. Canadian wheats of Manitoba No. 1 grade are considered to be the most suitable and they are being purchased, regardless of price, almost exclusively. One miller stated that if there were no milling restrictions on the quantity of foreign wheat that could be used, the most satisfactory mixture would be 60 percent domestic wheat, 30 Manitoba, and 10 percent hard winter or Plate wheat.

In former years United States hard winter wheats were much used as well as a considerable quantity of United States hard wheat flours. The pastry trade of Sweden and the other Scandinavian countries demands a strong flour. United States hard winter wheats and hard winter flours were considered about ideal for this purpose. Some Argentine wheats are suitable for this purpose, but with limitations placed on the proportion of foreign wheat or flour that may be used, it is doubtful whether these would be satisfactory unless they were of premium quality.

It has been admitted that the present quality of domestic milled flour is not so good as formerly. The limited percentage of foreign wheat that millers are permitted to use, even though it is of the best quality obtainable, is not sufficient to enable them to produce a strong flour. The quality of the 1932 and 1933 crops of domestic wheat was the best in recent years and, even so, satisfactory results have been difficult to attain. It will be even more difficult in years when the crop is of ordinary or average quality. Millers believe that under such circumstances the Government will have to relax its restrictions pertaining to the use of foreign wheat. The commission responsible for the milling regulations is intrusted with maintaining a standard of quality for flour which will be satisfactory for trade requirements, and it is probable that some leniency will be shown in crop years when the quality of domestic wheats is not so good as recently.

To learn the effect of its regulations on the quality of the flour for domestic consumption, this commission engaged the services of Å. Åkerman and the milling and baking laboratory at his plant-breeding institution (Sveriges Utsädesförening) at Svalöf. Men connected with this institution collect flour samples from the various mills at regular intervals and test their baking quality. Mills that are not producing flour of satisfactory quality sometimes are advised regarding methods of treating wheat and flour that may be of benefit in im-

proving quality and are assisted in procuring domestic wheats more suitable for their purposes. Much experimentation has been done on the use of chemicals for improving the baking quality of flour and practically all mills use one or more methods of treatment.

In judging the milling properties of wheat, protein content plays a much more important part in this than in other European countries. The routine testing for protein content is a common practice in the laboratories of the larger mills and is used as an index of value for domestic spring wheats. Besides having a relationship to natural baking quality, the quantity of protein present is also believed to determine the extent to which the natural or inherent qualities of grain may be augmented by artificial means. High-protein wheats respond to treatment much more readily than those of low protein content.

BAKING PRACTICES

In the country districts most of the baking is done in the homes, but in the cities little home baking is done except in families of the well-to-do class, who bake a considerable quantity of fancy or special products. From the standpoint of the country as a whole, commercial baking is carried on chiefly as a handicraft, but in recent years the industry has begun to develop more and more on a factory scale, so that now in the larger cities the factory type of bakery does the major part of the business. The industry may be divided into two main types, one for the production of soft fresh breads, pastries, cakes, etc., consumed locally, and the other for the production of biscuits and hard breads of the knackebrod and spishbrod type for supplying a larger market.

The hour at which bakers may begin their day's work is regulated by law. Bakers are permitted to have one man begin work at 4 a. m., but other employees may not begin work until 6 a. m. This is a serious handicap in the production of the fresh breads for breakfast demanded by the public. To overcome this handicap, the baker either uses a short fermentation method of baking or prepares his doughs the preceding day and after fermentation has progressed to a certain stage places them under refrigeration until the next morning or such time as they are needed. This second procedure is common and is applied to bread products and to pastry products as well.

The kind of wheat bread desired by the public is a soft-textured loaf with a thin crisp crust. The most popular types are the so-called French breads. These are made in two shapes or sizes—the large French and the small French. The former is a slender loaf about 14 inches in length and the other a round loaf somewhat larger than an ordinary roll. These breads have a soft, moist, but coarse texture and a thin, crisp crust. They lack the hard crust and harsh crumb of real French bread.

Most of the bread is hearth-baked. Although not much pan baking is done at present, there is some tendency for this form of baking to increase. In the case of wheat-flour breads, the increase in pan baking is furthered by the trend toward weaker flours as the result of governmental restrictions on the use of foreign wheats, and by the increased use of machine methods of baking. To obtain satisfactory results in hearth baking, stronger flour is required than in pan baking; moreover, the pan type of loaf is more adaptable to machine methods

of baking than the hearth loaf. One baker stated that 10 percent of his bread was pan-baked.

The common breads are known under the name of rye bread, although only a very small percentage of the output is made from pure rye flour. Most of these breads contain a considerable percentage of wheat flour, but those made in the southern part contain less than those in the northern part of the country. It is customary for millers to mix their low-grade, and in some instances, their clear-grade flours with their rye flours. The bakers usually add still more wheat flour at the time of baking. One of the foremost milling chemists believes that 3 years ago the average proportion in which wheat flour was mixed with rye flour by the millers was 40 to 45 percent and that the bakers added enough more of wheat flour so that the rye breads contained from 50 to 55 percent of wheat flour. Since that time the proportion of wheat flour added by the millers has increased to 55 percent, to which the baker contributes enough more to bring the wheat-flour content of the so-called rye flours up to 65 percent. From this practice it is apparent that the increase in consumption of wheat on the one hand and the decrease in consumption of rye on the other hand are not entirely due to a shift in consumers' demand from rye breads to wheat breads, but are partly due to a shift toward lighter and whiter rye breads.

The trend in bread consumption is said to be downward, but it is not known whether this is because of any inferiority of quality as the result of governmental milling regulations or because of generally depressed conditions. It is the general belief, however, that if the present regulations remain in force during a year when the domestic wheats are of their normal low-gluten quality, the wheat bread will be of such inferior quality as to have a marked effect on wheat-bread consumption. This will tend either to a decrease in consumption or to a shift to rye breads. The popularity of wheat bread is chiefly based upon its appearance and texture of crumb. Flavor is of secondary importance. Appearance and texture of crumb is dependent on the quality and quantity of its gluten and when these are deficient, people will turn to other foods. As rye flour contains no gluten, rye breads are incapable of possessing the lightness of texture of wheat breads. But rye possesses a much more pronounced flavor than wheat, and it is chiefly for its characteristic flavor that rye breads are eaten. Its flavor never fails; consequently, there may be some inclination on the part of the people to substitute rye for wheat bread when the quality of the latter is poor.

One Swedish miller reported that of the wheat flour produced in Sweden the proportion used for various purposes was about as follows:

	Percent
Wheat breads, cakes, and pastries	66
Mixed with rye flour for rye breads	25
Biscuits and wafers	1
Spisbrod and knackebrod	8
	100

Swedish pastries called wiener brod are of a type peculiar to the Scandinavian countries. They have a very flaky texture and definite taste. The cakes, tea biscuits, and wafers are similar to those made in England. No bakery products of the type known in the United

States as oyster crackers, saltines, and soda crackers are made, but there is a considerable production of spisbrod and knackebrod, which are crackers of a different sort. Large quantities of knackebrod are exported. This product is a flat crisp cracker in several grades, made from rye or mixed wheat-and-rye flours containing some bran and germ stock. In the United States it is generally known under the names of "Swedish rye bread" and "rye crisp." The Swedish production of spisbrod and knackebrod in 1931 is reported as amounting to nearly 200,000,000 pounds.

In the northern part of Sweden, particularly among the woodsmen, a peculiar kind of pancake is used instead of bread. This pancake is made from a batter consisting of water, salt, and any kind of mixture of flour (wheat, rye, or barley) that happens to be available. The batter is allowed to stand 30 to 50 minutes to permit swelling of the starch, and at about 5-minute intervals it is thoroughly stirred. The batter is then poured into greased pans and baked in the oven. The cakes are about an inch thick. It is estimated that from 5 to 10 percent of the total quantity of flour used in Sweden is consumed in this form of baking. Flour that will produce cakes with a smooth top surface of yellow color is considered also to have good bread-baking qualities but if the top surface has a slippery or watery appearance, the flour is considered to be of poor bread-baking quality. This relationship is considered so reliable that some millers determine the suitability of their flours for bread-baking purposes by means of the pancake-baking test.

DIETARY HABITS

The Swedish people are heavy eaters and preferably their meals consist of a wide variety of foods. Their pastries, which are of the puff-paste type, are of excellent quality. Their wheat-flour breads are of good quality. Their so-called rye breads are usually of the light-textured type having a high proportion of wheat flour. Most of the bread used is of this type. Some rye breads of the black type are made, but they are in the nature of special breads. Zwieback, knackebrod, spisbrod, and sweetened breads are very popular. Much coffee is consumed, particularly among the people of the northern part of the country. Hors d'oeuvres, prominent at meals, can be bought ready for serving in food shops and from street peddlers. They are of various kinds, including salads, pickled or preserved vegetables, eggs, fish, and meats.

SWITZERLAND

Switzerland has a population of approximately 4,000,000 people and an area of 15,976 square miles or slightly greater than the combined areas of the States of Maryland and Delaware.

Wheat is the principal bread grain of this country. Rye plays a minor part in bread making its consumption for bread purposes probably does not represent more than 7 or 8 percent of the total of bread grains used. Pure rye breads are little used except by peasants in certain mountain districts where rye is the only cereal grain that can be grown. In other sections the use of rye in bread making is generally in combination with wheat in which combination the percentage of rye is very small.

BREAD-GRAIN PRODUCTION AND REQUIREMENTS

During the 5 crop years, 1929-33, wheat production has averaged slightly more than 4,000,000 bushels annually and rye production slightly less than 1,500,000 bushels (tables 55 and 56). Compared with pre-war production recent production represents, in the case of wheat, a substantial increase and, in the case of rye, a substantial decrease.

TABLE 55.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Switzerland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports	Exports ¹	Apparent utilization ²	
						Total	Per capita
	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>Bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>Bushels</i>
Average:							
1909-13	105	3,311	31.6	16,937	11	20,237	5.4
1924-28	121	3,961	32.2	15,919	1	16,850	5.0
1929-33	135	4,131	30.0	18,695	11	22,785	5.6
Annual:							
1929	129	4,207	32.6	16,915	1		
1930	131	3,605	26.9	18,393	4		
1931	134	4,045	30.2	21,129	27		
1932	137	4,001	29.2	19,313	28		
1933	140	4,799	34.3	17,688	10		
1934	166	5,071	30.5	17,512	3		

¹ Year beginning July 1, except 1909-13, which began Aug. 1; no flour reported.

² Stocks at the beginning and end of periods are disregarded.

³ Less than 500 bushels.

⁴ Wheat acreage, including spelt and maslin, was reported at 211,000 acres. Since about 45,000 acres are usually sown to spelt and maslin together, this amount has been deducted from the total to give wheat alone.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 56.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Switzerland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports	Exports ¹	Apparent utilization ²	
						Total	Per capita
	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>Bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>Bushels</i>
Average:							
1909-13	50	1,783	29.7	728	1	2,510	0.7
1924-28	51	1,647	32.3	39	1	1,886	0.1
1929-33	37	1,301	31.7	321	1	1,815	0.4
Annual:							
1929	47	1,571	33.4	290	0		
1930	50	1,457	29.1	296	0		
1931	46	1,401	30.5	177	1		
1932	46	1,480	32.2	615	0		
1933	36	1,515	33.6	237	0		
1934	35	1,212	35.5	282	0		

¹ Year beginning July 1, except 1909-13, which began Aug. 1.

² Stocks at beginning and end of periods are disregarded.

³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

The apparent annual consumption of wheat in recent years has averaged about 23,000,000 bushels. Of the quantity of wheat consumed, domestic production supplies only about one-fifth and imports from foreign countries the other four-fifths. The quantity of rye

consumed is also in excess of domestic production but only to the extent of a few hundred thousand bushels. Compared with consumption in the pre-war period, 1909-13, wheat consumption during the 1929-33 period was higher, whereas rye consumption was lower. This holds true for per-capita consumption as well as for total consumption.

IMPORTS AND EXPORTS OF WHEAT AND RYE

Practically all importations of wheat and rye are in the form of grain. Only an insignificant quantity of these cereals is imported as flour. Annual wheat imports during the period 1929-33 averaged 18,668,000 bushels, whereas rye imports averaged only 324,000 bushels. These figures represent, in the case of wheat, an increase of about 10 percent over the 1909-13 pre-war period average and in the case of rye, a decrease of about 55 percent.

According to import statistics published by the Swiss Government, (table 57) Canada, the United States, and Argentina, in the order named, in recent years have been the principal sources of imports of wheat. Since 1932, however, imports from the United States have shrunk to almost nothing. Other countries from which Switzerland has imported considerable quantities of wheat in past years are Union of Soviet Socialist Republics, Hungary, Australia, Rumania, and Germany. In pre-war times Russia was the chief source of supply.

TABLE 57.—Imports of wheat into Switzerland by country of origin, calendar years 1913 and 1925-33

Source	1913	1925	1926	1927	1928	1929	1930	1931	1932	1933
	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
United States...	5,312	5,181	3,002	5,258	3,303	2,765	3,237	3,321	1,752	670
Canada	2,952	7,609	10,681	9,065	10,481	9,075	10,058	8,679	10,087	8,830
Argentina	1,211	1,156	1,262	1,025	1,303	3,679	1,748	1,882	4,318	5,252
Australia	36	120	40	729	123	62	16	68	46	26
Russia	5,835	436	475	103	147	909	2,532	403	480	480
Hungary	1	110	203	51	186	1,506	323	1,017	215	1,862
Rumania	1,845	47	96	17	—	—	148	1,731	878	38
Germany	935	—	85	3	—	83	41	106	1,162	752
Other countries...	89	40	85	8	11	—	938	132	267	821
Total	19,146	15,065	16,100	16,625	16,834	17,149	17,631	20,504	19,158	18,731

* From Austria-Hungary.

Swiss Statistical Year Book.

Exports of wheat and rye from Switzerland seldom in any year have amounted to more than a few thousand bushels.

CHARACTERISTICS AND QUALITIES OF SWISS WHEATS

In considering the wheats of Switzerland, some account should be taken of the production of mischel (mixed wheat and rye, in some other countries called maslin) and spelt. Much of the production of mischel is the result of spring seeding of rye in the fall-sown wheat fields in which wheat has been partially winter-killed. According to Swiss marketing practices mischel is any mixture of wheat and rye in which the proportion of the latter is more than 5 but less than 50 percent. If less than 5 percent of rye is present, the mixture is considered as wheat and if rye is present to the extent of 50 percent or more, the mixture is considered as rye.

Spelt is said to yield better than wheat in wet sidehill fields where the soil is heavy, but in the higher altitudes it is not so productive as rye. It is used as a bread grain. The bread-baking properties are said to be equivalent to those of the common wheats of domestic production. In a few of the larger mills it is used in the production of pastry flour for which it is said to be especially well suited. Before spelt is milled into flour it is given a special decortication treatment for the removal of the chaff from the kernel. This treatment is sometimes applied at the mill but is more often applied at the point of origin or some intermediate point as a part of the marketing procedure. It is said that 145 kg of spelt are required to yield 100 kg of decorticated grain.

According to estimates furnished by a member of the governmental agency responsible for the handling and marketing of the domestic grain crop, wheat makes up approximately 61 percent, rye 13, and spelt and mischel each 8 percent of the total of these grains produced in Switzerland.

Of the common wheat produced, approximately one-fourth is spring-sown and three-fourths fall-sown. Practically all is of red color. The spring wheat is of semihard texture and is very similar in appearance to United States hard red spring wheat. The winter wheat is similar in physical appearance to the harder types of soft red winter wheat of Michigan, Ohio, and Pennsylvania.

Some durum wheat may be produced in the mountainous sections bordering Italy, but certainly not to any considerable extent.

The Government maintains two agricultural experiment stations for the selection and improvement of cereal grains— one at Lausanne in the western part of the country and the other at Oerlikon in the eastern part. It is the policy of these experiment stations to introduce only varieties of good baking quality and to discourage the production of varieties of poor quality even though they produce larger yields than other known varieties. Because of this policy squarehead varieties, which are inherently of low quality, have been kept out of Switzerland.

At present the procedure generally followed in the introduction of new varieties is to distribute seed to peasant-farmer organizations. This seed is given to one of the peasant members for sowing. The Government buys the crop produced from this seed at 40 Swiss francs per 100 kg (\$3.56 per bushel) and then sells to other farmers at a price of 14 francs (\$1.25 per bushel).

The most important varieties of wheat in Switzerland are as follows:

In French Switzerland: Mont Calme 22, a winter variety, and Huron, a spring variety.

In German Switzerland: Plantahof No. 3, Strickhof, and Rothenbrunnen No. 10, winter varieties, and Huron and Wagenburg, spring varieties.

GOVERNMENTAL POLICIES AFFECTING THE GRAIN AND MILLING INDUSTRIES

In 1915 a State grain monopoly was established for the purchase and sale of grains, foreign as well as domestic. In 1929 this monopoly was abolished and a new plan of control was established which in some respects was also monopolistic in character. It provided for the pur-

chase of wheat and rye at guaranteed prices based on quality, maintenance of grain reserves, payment of grinding subsidies, reduction of transportation charges, and support of the national milling industry. This entire plan is supported by a small tax, called a statistical tax, on all goods imported into Switzerland. Under this plan the right to import flour for bread-making purposes is reserved to the State. The right to import grain is not reserved to the State, but a small duty is charged on these importations. The millers are compelled to take domestic grain purchased by the State grain office but at a much lower price than that paid to farmers. The price to the farmer is based largely on production costs whereas the price charged the miller approximates world market prices. Losses resulting from these operations are paid for out of the statistical-tax collections.

Under authority of a law dated December 23, 1931, the Swiss Federal Council inaugurated a quota and licensing system for the importation of grains. Based on reciprocal trade agreements with other countries, grain importations are restricted to certain countries and definite limits are placed on the quantity that may be imported from each. The sum total of the quantities or quotas allotted to the various countries is fixed in accordance with the estimated domestic requirements minus domestic production. In addition to these import limitations which apply to the country as a whole similar import quotas are established for each mill based on its production capacity and on the volume of business done in past years.

Millers are required to mill to a flour extraction of at least 70 percent. To give added assurance that this regulation will be complied with, the Government on January 1, 1934, placed a tax of 75 centimes per 100 kg (6.25 cents per bushel) on the production of mill offals. The Government also requires that the flour produced shall be of the two following grades:

	Portion of extraction (percent)
First.....	0 to 18
Second.....	19 to 70 (and upwards)

The first-grade flour (patent) is used for pastries, cakes, and luxury breads, and the second-grade is used for common breads and ordinary household purposes.

The Government maintains ownership of 80,000 metric tons (almost 3,000,000 bushels) of foreign wheat as a national reserve for use in times of war and other emergencies. One-half of this wheat is kept in storage houses owned or operated by the Government and the other half, 40,000 tons, is stored in the warehouses and silos of commercial mills. The millers receive no compensation for this service, but are permitted to use the Government's wheat provided they substitute other foreign wheat for it, but the wheat substituted must actually be on hand. In this way the stocks owned by the Government can be renewed from year to year to prevent deterioration from age.

In a trade agreement with the United States effective February 15, 1936, Switzerland guarantees to the United States an annual quota on imports of wheat of 4,409,000 bushels.

MILLING PRACTICES AND WHEAT PREFERENCES

There are approximately 300 mills in Switzerland, only about 40 of which have a wheat-grinding capacity of 10 metric tons or more

per 24 hours. Most of the mills are of small capacity and operate as custom mills. The largest mill, Moulin Cooperatif de Zurich, is of 80 metric tons capacity. Zurich is the largest milling center.

Only two mills, both located at Zurich, have chemical laboratories. Other mills when in need of chemical-analysis service submit their samples to a commercial laboratory operated by a mill-machinery manufacturing company, but as a general rule Swiss millers do not consider that chemical analyses are important.

The grain-cleaning and conditioning equipment used in Swiss mills, although including all the different types of machines and devices essential for good cleaning and conditioning, is not so complete or so elaborate in character as in English mills. Only a few of the mills are equipped with washers. The system of milling employed is similar to that used in Germany.

The grain-storage accommodations at Swiss mills are generally relatively greater than those at mills in other European countries. Probably this is partly because of the geographical location and mountainous character of the country which affect the accessibility of outside sources of supply. A Zurich mill of 50 metric tons daily grinding capacity visited by the author had storage space, chiefly of the silo type, for approximately 4,000 metric tons of grain. This mill was required to keep in storage 1,000 metric tons of Government-owned grain. In addition it usually keeps in storage from 2,000 to 3,000 metric tons for its own purposes. A mill of 22½ metric tons grinding capacity, visited at Geneva, had silo storage space for 1,500 metric tons of grain and warehouse space for 400 metric tons. This mill usually carries from 3 to 4 months' supply of grain in addition to 530 metric tons of Government-owned grain which it was required to store. The director of this mill was of the opinion that Swiss mills, on the average, carry from 2 to 3 months' supply of grain.

Wheats of strong baking quality are the kind chiefly wanted from foreign countries. Canadian spring, United States hard winter, and the better types of Russian and Argentine wheats are the sorts best liked. Under conditions that permit the miller full freedom of choice in the wheats he uses, a milling mixture that is considered to be typical of Swiss milling practice is one consisting of 30 percent Canadian, 20 United States hard winter, 25 Argentine, and 25 percent domestic and other wheats. Another mixture reported as being suitable consists of 50 percent Nos. 1 and 2 Northern Manitobas, 30 percent United States hard winter, and 20 percent Swiss wheat. Nos. 1 and 2 Northern Manitobas are the grades of Canadian wheat most generally used at present. Some wheat of the No. 1 Hard Manitoba grade is also used and occasionally some of the lower grades but these latter are less useful now than formerly, because the compulsory use, under existing import regulations, of other inferior wheats makes it desirable that the Canadian wheats used be only of the better grades.

As regards Argentine wheats, the premium qualities are mostly used. Bahia Blanca shipments of wheat of the Kanred variety are considered the best in quality.

In the production of bread flours, Canadian wheats are first in preference and United States hard winters second. Besides bread-flour wheats, Switzerland uses approximately 60,000 metric tons of durum wheat annually in the production of semolina for macaroni and similar alimentary pastes. Inasmuch as it produces practically

no durum wheat, all the wheat of this type needed must be obtained from foreign countries. United States durum is suitable for this trade and much of it has been used in past years, but under the import regulations that have been in force in recent years, it is no longer possible to import any of this wheat.

Some of the United States durum wheat formerly used came through Canadian ports and some through United States ports. Inspections in connection with the shipment of United States durum wheat through Canadian ports are generally known in Switzerland and other European countries as "seaboard" inspections and those in connection with shipments through United States ports as "Federal" inspections. Wheat that carries an inspection certificate of the latter kind commands a higher price than the so-called seaboard-inspected wheat.

The Government requires a minimum flour extraction of 70 percent, but the usual extraction for the commercial mills, at present, is about 74 percent. Previously, when millers were free to import as much Canadian and United States wheats as they wished, it is said that flour extractions were about 75 percent.

BAKING PRACTICES

The baking of bread is done chiefly in small shops. Only in a few of the largest cities are there any bakeries of the so-called factory type.

The mechanical equipment used in the shop type of bakery usually consists only of a mixer of the slow-speed bowl type and a hand-operated divider for use in making rolls. The ovens are generally electrically heated. Both the sponge-and-dough and the straight-dough baking methods are used. A quick-fermentation procedure is used, because of a law prohibiting work in bakeries before 2 a. m. The leavening agent employed is usually sour dough; yeast is used only in the cities, and, in many of them, not very extensively.

Practically all breads are hearth-baked. The materials used in making common breads are flour, water, and salt. Some milk is used in luxury breads and rolls, and some sugar and fats but these ingredients are too expensive for use in the common breads.

Bread prices are fixed by agreement among the members of bakers' guilds except that the Government exercises some supervision over the price-fixing procedure.

As judged from 1934 quality characteristics, the common breads have a thick, harsh, dark-brown crust with a soft, spongy interior of coarse texture. The crumb is of light-grey color and of good flavor. The breads made by the sour-dough-fermentation method have a slightly sour taste. Compared with French breads, the common breads made in Switzerland are of slightly better flavor and have a coarser, harder crust but a softer and more moist crumb. Their grey color is due to the use of a long-extraction wheat flour, which frequently contains some rye flour.

Both the luxury loaf breads and the rolls are generally of excellent quality. The rolls have a thin, fine crisp crust, with a creamy-colored close-grained spongy interior, and a very pleasing flavor. Formerly the breads were of better quality than at present, because better wheat was used in milling mixtures.

DIETARY HABITS

Breakfast comes at 7 a. m. and in the cities consists of coffee (half milk) and bread with jam, and sometimes butter. Formerly sugar was not generally used in coffee, but in recent years, owing to its cheapness, most people have formed the habit of using it.

Dinner comes at 12 m. to 1 p. m., and is the principal meal of the day. It consists of bread, soup, potatoes, vegetables, stewed fruit or a pudding, and, usually, meat. City people have only a small quantity of bread with this meal, but in the country much more is eaten. No coffee is served, but children are usually given milk and the adults sometimes have beer.

Supper comes at 6 to 7 p. m. and is light, consisting of coffee (half milk), bread, stewed fruit or berries, and fried potatoes, eggs, or fish.

The working day for the laborers at present is under governmental regulation and, for most forms of employment, is limited to 7½ hours of work. Before the World War the work day, in a number of occupations, was much longer, 11 hours of labor being required. Under such conditions the people found it necessary to have a lunch in the middle of the forenoon and afternoon, in addition to their other meals. With the shortening of the work day the intermediate lunch habit was discontinued and as a result the consumption of bread has materially decreased. Within the last few years milk drinking between meal times has come into favor and the practice is tending to increase.

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APPENDIX

TABLE 58.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Austria, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bu.	1,000 bu.	1,000 bu.	Bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	Bu.
Average:													
1909-13	468	20	635	497	10,211	12,813	20.2	5,516	7,334	68	34	72,26,405	3.97
1924-28	501	22	523	11,584	393	12,277	23.5	10,185	4,677	76	42	26,921	4.00
1929-33													
Annual:													
1929	459	26	515	11,089	470	11,559	22.4	10,415	8,115	98	34		
1930	486	23	505	11,603	403	12,008	23.6	8,802	8,228	216	51		
1931	495	22	517	10,613	396	11,009	21.3	11,270	2,021	21	93		
1932	515	19	511	11,886	307	12,193	22.8	12,681	1,341	26	15		
1933	523	20	513	11,227	389	11,616	20.9	8,357	2,279	20	19		
1934	518	20	508	12,794	415	13,239	23.3	7,850	1,790	19	18		

¹ Year beginning July 1; exports of 1921 reported by the International Institute of Agriculture for year beginning Aug. 1.

² Flour converted to grain on basis of 4.5 bushels per barrel.

³ Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 59.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Austria, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	1,110	23,785	21.4	4,439	89	23,662	3.55
1924-28	947	19,321	20.4	2,914	72	25,028	3.72
1929-33	940	22,186	23.6				
Annual:							
1929	925	20,097	21.7	5,258	60		
1930	927	20,635	22.3	4,502	86		
1931	931	18,931	20.3	3,185	60		
1932	957	21,227	25.3	1,129	77		
1933	958	27,042	28.2	404	70		
1934	949	23,896	25.2	3,148	61		

¹ Year beginning July 1; flour included, converted to grain on basis of 6 bushels per barrel.

² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 60.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Bulgaria, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
Average:	1,900 acres	1,900 acres	1,900 acres	1,900 bu.	1,900 bu.	1,900 bu.	bu.	1,900 bu.	1,900 bu.	1,900 bu.	1,900 bu.	1,900 bu.	bu.
1909-13	2,584	41	2,625	38,277	498	38,775	15.7	—	—	998	—	998	6.8
1924-28	2,961	21	2,982	51,325	259	51,584	17.3	399	—	4,452	—	517,47,014	8.0
1929-33	2,634	27	2,661	32,973	221	33,194	12.5	190	—	77	—	—	—
1929	2,979	27	3,006	57,049	268	57,317	19.1	1,801	—	4,581	—	460	—
1930	3,028	25	3,053	63,526	305	63,831	20.9	—	—	0	10,059	1,736	—
1931	3,102	19	3,121	47,883	212	48,095	15.4	—	—	0	2,090	654	—
1932	3,077	20	3,097	55,195	239	55,434	17.9	—	—	0	4,555	211	—
1933	3,095	19	3,114	39,460	135	39,595	12.7	—	—	—	—	—	—

¹ Year beginning July 1.² Stocks at beginning and end of periods are disregarded.³ Flour converted to grain on basis of 4.5 bushels per barrel.⁴ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 61.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Bulgaria, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Exports ¹	Apparent utilization ²	
					Total	Per capita
Average:	1,900 acres	1,900 bushels	Bushels	1,900 bushels	1,900 bushels	Bushels
1909-13	542	8,345	15.4	—	—	—
1924-28	456	6,722	14.7	100	6,232	1.1
1929-33	570	9,865	17.3	891	8,974	1.5
1929	536	7,347	13.7	11	—	—
1930	657	12,620	19.2	2,441	—	—
1931	600	10,653	17.8	1,841	—	—
1932	513	9,630	16.6	123	—	—
1933	516	9,683	18.8	32	—	—
1934	476	6,576	13.8	0	—	—

¹ Year beginning July 1; flour included, converted on basis of 6 bushels per barrel.² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 62.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Czechoslovakia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ²	Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:													
1909-13			1,718			37,873	22.0						
1924-28	1,529	130	1,718	38,992	3,317	42,309	24.6	9,217	11,372	512	235	62,651	4.4
1929-33	1,082	91	2,073	51,082	2,268	54,250	26.2	12,273	3,595	43	3,212	66,833	4.5
Annual:													
1929	1,932	86	2,017	60,828	2,071	62,902	26.2	5,091	7,989	108	1,520		
1930	1,901	61	1,965	49,077	1,529	50,606	25.8	11,610	6,023	50	3,977		
1931	1,950	97	2,047	50,159	2,076	51,232	26.1	12,380	2,480	6	3,379		
1932	1,969	95	2,064	51,187	2,550	53,737	26.0	10,238	1,114	5	4,137		
1933	2,158	114	2,272	60,655	3,260	63,915	32.1	12,718	217	6	3,193		
1934	2,078	222	2,300	15,792	4,222	20,014	21.7						

¹ Year beginning July 1.² Converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.⁴ In 1927 the method of reporting Czechoslovak statistics was changed. This average is, therefore, not quite comparable with others, and adjustments have been made in winter and spring figures.⁵ Separately reported from Jan. 1, 1925, only.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 63.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Czechoslovakia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	2,605	63,548	24.4				
1924-28	2,330	58,118	25.0	6,347	422	64,073	4.5
1929-33	2,577	72,990	28.3	2,209	1,464	73,825	5.0
Annual:							
1929	2,679	72,185	26.9	502	3,016		
1930	2,585	70,373	27.2	719	1,737		
1931	2,470	54,630	22.1	9,832	886		
1932	2,569	85,669	33.3	396	1,021		
1933	2,584	82,163	31.8	48	670		
1934	2,412	60,008	24.6	35	8		

¹ Year beginning July 1; flour included, converted on basis of 5 bushels per barrel.² Stocks at beginning and end of periods are disregarded.³ In 1927 the method of reporting Czechoslovak statistics was changed. This average is, therefore, not quite comparable with others.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 64.—*Acreage, production, yield per acre, trade, apparent utilization of wheat in Estonia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							Bushels				
1909-13			23			361	15.8				
1924-28	28	30	58	467	369	836	14.9	791	386	1,813	1.7
1929-33	37	71	111	727	1,107	1,831	16.5	410	111	2,358	2.1
Annual:											
1929	26	56	82	403	857	1,260	15.1	920	298		
1930	36	51	90	780	855	1,635	18.2	653	227		
1931	38	61	99	686	1,052	1,738	17.6	478	12		
1932	40	88	128	711	1,311	2,055	16.3	1	2		
1933	41	111	155	1,021	1,427	2,451	15.8	0	1		
1934	55	106	161	1,263	1,711	3,107	19.3				

¹ Year beginning July 1. No exports reported.² Converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 65.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Estonia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage		Production		Yield per acre	Imports ¹		Apparent utilization ²	
								Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels		1,000 bushels	Bushels		
Average:									
1909-13	186	8,129	16.7						
1924-28	367	5,880	16.0	1,823	7,703	6.0			
1929-33	258	7,258	20.3	830	8,088	7.2			
Annual:									
1929	329	5,760	17.4	3,591					
1930	367	8,881	24.2	515					
1931	356	5,820	16.3	12					
1932	361	7,113	19.5	0					
1933	373	8,735	23.4	0					
1934	361	9,061	24.9	39					

¹ Year beginning July 1; flour included, converted on basis of 6 bushels per barrel. No exports reported.² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 66.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Finland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							Bushels				
1909-13			8			137	17.1	4,912		5,010	1.6
1924-28	21	17	41	582	339	911	23.0	11	5,095	6,050	1.7
1929-33	31	22	53	818	521	1,339	25.3	801	3,812	5,555	1.6
Annual:											
1929	24	11	34	514	221	765	22.5	9	5,611		
1930	21	11	35	610	256	866	21.7	130	4,718		
1931	29	16	45	719	372	1,121	24.9	632	3,555		
1932	32	27	59	810	613	1,453	25.1	1,460	2,880		
1933	45	46	91	1,316	2,469	3,785	27.0	1,771	2,461		
1934	58	67	125	1,610	1,767	3,277	26.2	2,191	1,857		

¹ Year beginning July 1, except for 1909-13, which are calendar years.² Flour converted to grain on the basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.⁴ Includes flour.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 57.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Finland, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports		Exports		Apparent utilization ²	
								Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels		
Average:									
1909-13	589	10,490	17.8						
1924-28	565	12,118	21.5	6,153	10		18,291	5.1	
1929-33	532	12,715	24.0	3,338	4		16,079	4.4	
Annual:									
1929	503	10,433	20.7	6,509	9				
1930	515	13,211	25.7	3,136	5				
1931	528	12,411	23.5	2,681	1				
1932	538	12,966	24.1	2,617	1				
1933	575	14,673	25.5	2,416					
1934	613	15,582	25.4	716	1				

¹ Year beginning July 1; flour included, converted on basis of 6 bushels of grain per barrel of flour.² Stocks at beginning and end of periods are disregarded.

Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 58.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Greece, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports		Apparent utilization ²	
				Wheat	Flour	Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:							
1909-13	4,134	6,26,273	11.1				
1924-28	4,231	11,180	2.3	15,576	1,788	31,841	5.2
1929-33	4,908	15,565	10.6	19,823	373	35,761	5.5
Annual:							
1929	4,257	11,431	9.2	20,520	1,201		
1930	4,396	9,709	7.0	23,661	117		
1931	4,196	13,228	7.5	23,771	167		
1932	4,398	17,067	11.1	19,167	50		
1933	4,712	28,385	16.6	11,888	31		
1934	4,983	28,809	11.5	13,587	69		

¹ Year beginning July 1.² Flour converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.

* 1911 only.

* Sown area.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 59.—*Acreage, production, yield per acre, trade,¹ and apparent utilization of rye in Greece, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Apparent utilization ²	
				Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	Bushels
Average:					
1909-13	76	1,129	11.9		
1924-28	113	1,163	12.9	1,457	0.21
1929-33	162	1,971	12.2	1,971	0.30
Annual:					
1929	128	1,315	10.5		
1930	157	1,837	11.7		
1931	172	1,800	10.5		
1932	168	2,057	12.4		
1933	183	2,800	15.3		
1934	201	2,509	11.4		

¹ No trade figures reported.² Stocks at beginning and end of periods are disregarded.

* Area sown.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 70.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Latvia, average 1900-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ³	Wheat	Flour ³	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels
Average:													
1900-13			85			1,475	17.4						
1924-28	82	49	131	1,482	666	2,148	16.4	1,905	16	419		4,031	32.2
1929-33	146	75	221	2,915	1,410	4,301	19.7	1,111	2	1	52	5,421	42.8
Annual:													
1929	96	49	145	1,562	771	2,336	16.1	2,520	4				
1930	128	51	179	3,241	818	4,062	22.7	1,962	4				
1931	119	66	185	2,332	1,056	3,388	15.8	790	0				
1932	173	82	255	3,840	1,462	5,292	20.8	283	0	4			
1933	183	126	309	3,748	2,977	6,725	21.8	0	0	0			
1934	260	142	402	5,137	2,911	8,051	22.9	0	0	0			

¹ Year beginning July 1.² Flour converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.⁴ Year beginning Aug. 1, International Institute of Agriculture, flour included.⁵ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 71.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Latvia, average 1900-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
								Total	Per capita
	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	
Average:									
1900-13	888	13,061	14.7						
1924-28	612	9,000	14.0	2,812	53	11,763		6.3	
1929-33	610	11,053	18.1	913	3	11,963		6.2	
Annual:									
1929	590	9,503	16.1	3,916	12				
1930	640	13,377	21.8	471	1				
1931	572	5,615	9.8	179	1				
1932	593	11,793	19.0	0	1				
1933	637	13,979	21.9	0	0				
1934	663	16,210	24.1						

¹ Year beginning Aug. 1; includes flour in terms of grain converted on basis of 6 bushels per barrel.² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 72.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Lithuania, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports	Exports		Apparent utilization	
	Winter	Spring	Total	Winter	Spring	Total			Wheat	Flour ²	Total	Per capita
	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels			1,000 bushels	1,000 bushels	1,000 bushels	1,000 Bushels
Average:							Bushels					
1909-13			211			3,261	15.5					
1924-28	191	105	296	3,360	1,487	4,847	16.5	7	118	0	4,866	2.2
1929-33	370	198	568	7,182	1,681	8,863	18.5	2	207	28	8,640	3.6
Annual:												
1929	315	113	428	6,991	2,338	9,329	19.1	11	80	0		
1930	322	93	415	7,508	1,528	9,036	21.8	0	912	0		
1931	370	99	468	6,852	1,483	8,335	17.4	0	38	27		
1932	400	100	500	7,810	1,577	9,387	18.5	0	5	76		
1933	393	166	559	6,712	1,480	8,192	16.4	0	1	56		
1934	403	111	514			10,475	20.4					

¹ Year beginning July 1.² Flour converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.⁴ Year beginning Aug. 1, including flour.⁵ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 73.—*Acreage, production, yield per acre, trade,¹ and apparent utilization of rye in Lithuania, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Apparent utilization ²	
				Total	Per capita
<hr/>					
Average:	1,000 acres	1,000 bushels	Bushels	1,000 bushels	Bushels
1909-13	1,749	21,283	13.9		
1924-28	1,233	19,625	15.9	19,625	8.7
1929-33	1,208	21,760	18.0	21,760	9.6
Annual:					
1929	1,127	22,030	19.5		
1930	1,250	26,293	21.0		
1931	1,257	16,223	12.9		
1932	1,194	22,521	18.9		
1933	1,210	21,731	18.0		
1934	1,225	26,331	21.5		

¹ No trade figures reported.² Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 74.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Rumania, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage			Production			Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
	Winter	Spring	Total	Winter	Spring	Total		Wheat	Flour ²	Wheat	Flour ²	Total	Per capita ³
Average:	1,000	1,000	1,000	1,000	1,000	1,000	Bu.	1,000	1,000	1,000	1,000	1,000	Bu.
1909-13	acres	acres	acres	bu.	bu.	bu.		bu.	bu.	bu.	bu.	bu.	
1924-28	7,154	809	7,963	93,917	6,647	100,564	12.5	3,434	38	3,952	2,496	93,708	5.3
1929-33	6,598	630	7,228	101,089	7,093	108,182	14.3	25	1	10,560	542	97,001	5.3
Annual:													
1929	6,130	634	6,764	89,447	10,305	99,752	11.7	66	(*)	2,130	729		
1930	6,573	678	7,251	122,625	8,146	130,771	17.3	14	1	15,092	968		
1931	7,863	703	8,566	129,864	5,430	135,294	15.8	13	(*)	35,343	976		
1932	6,517	574	7,091	51,658	3,879	55,537	7.8	16	5	39	35		
1933	7,109	591	7,700	111,836	7,236	119,072	15.5	18	0	235	14		
1934	6,219	591	6,810	70,567	5,986	76,553	10.1	7	0	3,432	0		

¹ Year beginning Aug. 1. Pre-war trade figures are not available for post-war boundaries.² Converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.⁴ 4-year average.⁵ Figures somewhat incomplete since imports in 1928-29 are available for 7 months only.⁶ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 75.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Rumania, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹		Exports ¹		Apparent utilization ²	
								Total	Per capita ³
Average:	1,000 acres	1,000 bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Bushels	Bushels
1909-13	acres	bushels		bu.	bu.	bu.	bu.		
1924-28	1,286	20,644	16.1	0	0	1,096	8,116	0.5	
1929-33	699	9,202	13.2	10	0	1,204	13,516	0.6	
Annual:									
1929	773	13,366	17.2	0	0	661			
1930	908	18,288	18.0	0	0	2,267			
1931	1,000	13,962	13.9	0	0	3,131			
1932	861	10,513	12.2	0	0	41			
1933	928	17,555	15.3	0	0	0			
1934	912	8,308	9.1	0	0	0			

¹ Year beginning July 1; flour included converted to grain on basis of 6 bushels per barrel.² Stocks at beginning and end of periods are disregarded.³ 4-year average.⁴ Trade figures not available for pre-war years covering post-war territory.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 76.—*Acreage, production, yield per acre, trade, and apparent utilization of wheat in Yugoslavia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production			Yield per acre	Exports:		Apparent utilization ³	
		Winter	Spring	Total		Wheat	Flour ¹	Total	Per capita
	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>bushels</i>
Average:									
1909-13	3,982			62,021	15.6				
1924-28	4,387	71,706	1,835	73,541	16.8	6,033	1,308	85,540	5.0
1929-33	5,165	83,468	1,360	84,828	16.4	8,814	316	75,698	5.4
Annual:									
1929	5,213	93,173	1,820	94,993	18.2	22,052	800		
1930	5,216	78,075	1,651	80,326	15.3	5,107	230		
1931	5,289	97,651	1,138	98,789	18.7	15,145	220		
1932	4,820	52,447	997	53,444	11.1	1,025	141		
1933	5,256	95,393	1,180	96,572	18.4	709	126		
1934	5,102			68,328	13.7	1,350	90		

¹ Year beginning July 1.² Converted to grain on basis of 4.5 bushels per barrel.³ Stocks at beginning and end of periods are disregarded.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 77.—*Acreage, production, yield per acre, trade, and apparent utilization of rye in Yugoslavia, average 1909-13, 1924-28, 1929-33, annual 1929-34*

Year	Acreage	Production	Yield per acre	Imports ¹	Exports ¹	Apparent utilization ²	
						Total	Per capita
	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>bushels</i>
Average:							
1909-13	732	9,004	12.3				
1924-28	497	6,862	13.8	5	214	6,651	0.5
1929-33	607	8,339	13.7	1	13	8,327	0.6
Annual:							
1929	587	8,268	14.1	1	60		
1930	610	7,825	12.8	6	2		
1931	603	7,614	12.6	(1)	0		
1932	600	8,328	13.9	0	0		
1933	633	9,659	15.3	0	1		
1934	613	7,688	12.5				

¹ Year beginning Aug. 1; flour included, converted on basis of 6 bushels per barrel.² Stocks at beginning and end of periods are disregarded.³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division from official records, and from publications of the International Institute of Agriculture.

TABLE 78.—Acreage of wheat in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13	Average 1924-28		Average 1929-33		1934	
		Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13
	1,000 acres	1,000 acres	Percent	1,000 acres	Percent	1,000 acres	Percent
France.....	10,530	13,207	89.0	13,277	89.5	13,351	89.9
Italy.....	11,794	11,492	101.2	12,073	102.4	12,262	101.0
Spain.....	9,517	10,055	111.6	11,083	116.1	11,101	115.3
Rumania.....	8,615	7,060	83.7	7,534	79.2	7,610	80.0
Germany.....	4,029	4,002	100.3	5,015	124.5	5,430	131.8
Yugoslavia.....	3,182	4,387	110.2	5,163	120.7	5,002	125.6
Poland.....	3,313	3,230	106.6	4,108	122.0	4,385	131.2
Hungary.....	3,409	3,779	101.8	3,925	105.7	3,798	102.3
Bulgaria.....	3,712	2,628	109.1	2,988	124.0	3,114	129.3
Czechoslovakia.....	1,718	1,718	100.0	2,673	120.7	3,300	133.9
Greece.....	1,131	1,231	108.8	1,468	129.5	1,983	174.9
British Isles.....	1,887	1,621	86.1	1,455	77.1	1,903	104.0
Portugal.....	1,211	1,061	87.9	1,267	104.6	1,458	120.4
Sweden.....	255	437	171.4	690	270.6	719	282.0
Austria.....	635	497	78.3	523	82.4	568	89.4
Lithuania.....	211	206	100.3	478	226.6	514	243.6
Belgium.....	404	372	92.1	331	81.3	385	95.3
Netherlands.....	138	137	99.3	216	156.5	359	260.1
Latvia.....	85	131	154.1	221	260.0	351	412.9
Denmark.....	174	225	146.1	255	165.6	282	183.1
Switzerland.....	105	121	115.2	135	128.6	168	158.1
Estonia.....	23	58	252.2	111	482.6	161	700.0
Finland.....	8	41	512.5	53	662.5	125	1,562.5
Norway.....	12	24	200.0	29	241.7	46	383.3
Total.....	72,810	69,849	95.9	74,523	102.4	77,336	106.4

Computed by the Foreign Agricultural Service Division.

TABLE 79.—Acreage of rye in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13	Average 1924-28		Average 1929-33		1934	
		Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13
	1,000 acres	1,000 acres	Percent	1,000 acres	Percent	1,000 acres	Percent
Poland.....	12,570	13,719	109.1	14,276	113.6	14,014	111.5
Germany.....	12,713	11,323	89.5	11,257	88.5	11,097	87.3
Czechoslovakia.....	2,005	2,330	89.4	2,577	98.9	2,412	93.7
Hungary.....	3,035	2,021	65.4	1,781	57.5	1,694	54.7
France.....	4,038	1,052	202.7	1,500	98.9	1,686	98.0
Spain.....	1,988	1,777	89.4	1,512	76.1	1,451	73.0
Lithuania.....	1,749	1,235	70.6	1,208	69.1	1,225	70.0
Austria.....	1,110	947	85.3	910	81.7	949	85.5
Rumania.....	1,280	609	54.4	913	71.0	912	70.9
Latvia.....	888	612	72.3	610	68.7	663	74.7
Yugoslavia.....	772	407	67.9	607	82.9	613	83.7
Finland.....	590	595	95.9	532	90.3	613	101.1
Sweden.....	977	745	76.3	560	67.3	589	59.7
Belgium.....	672	567	84.4	561	83.5	544	81.0
Bulgaria.....	542	456	84.1	570	105.2	476	87.8
Netherlands.....	557	489	87.8	445	79.9	450	80.8
Portugal.....	271	556	205.2	401	148.0	407	150.2
Denmark.....	636	465	73.1	316	54.4	375	59.0
Estonia.....	485	367	75.5	358	73.7	364	74.9
Italy.....	346	397	88.7	297	86.8	278	80.3
Greece.....	76	113	148.7	162	213.2	204	268.4
Switzerland.....	60	51	85.0	47	78.3	35	58.3
British Isles.....	57	57	100.0	38	66.7	24	41.9
Norway.....	37	22	59.5	17	45.9	15	40.5
Total.....	45,593	41,608	91.3	41,567	91.2	40,990	89.9

1 Exclusive of British Isles.

Computed by the Foreign Agricultural Service Division.

TABLE 80.—Total acreage of wheat and rye in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13	Average 1924-28		Average 1929-33		1934	
		Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13	Acreage	Percent- age of 1909-13
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Percent</i>	<i>1,000 acres</i>	<i>Percent</i>	<i>1,000 acres</i>	<i>Percent</i>
Poland.....	15,913	16,919	106.5	18,384	115.5	18,399	115.6
Germany.....	16,742	15,385	91.9	16,272	97.2	16,527	98.7
France.....	19,595	15,321	78.2	15,058	76.8	15,018	76.8
Spain.....	11,535	12,372	107.8	12,595	109.2	12,552	108.8
Italy.....	12,139	12,239	100.8	12,370	101.9	12,510	103.3
Rumania.....	10,891	8,659	80.2	8,447	78.2	8,522	78.9
Yugoslavia.....	4,714	4,881	103.6	5,772	122.4	5,615	119.1
Hungary.....	5,320	5,431	102.1	5,515	103.7	5,384	101.2
Czechoslovakia.....	4,323	4,048	93.6	4,650	107.6	4,742	109.7
Bulgaria.....	2,951	3,084	104.5	3,568	120.6	3,590	121.7
Greece.....	1,210	1,347	111.3	1,630	134.7	2,187	180.7
British Isles.....		1,681		1,403		1,987	
Portugal.....	1,482	1,620	109.3	1,608	112.6	1,865	125.8
Lithuania.....	1,000	1,531	78.1	1,086	86.0	1,739	88.7
Austria.....	1,745	1,441	82.8	1,463	83.8	1,517	86.9
Sweden.....	1,232	1,182	95.9	1,250	101.5	1,362	105.7
Latvia.....	973	773	79.4	831	85.4	1,011	104.2
Belgium.....	1,076	939	87.3	912	87.5	920	86.3
Netherlands.....	695	626	90.1	661	95.1	809	116.4
Finland.....	597	606	101.5	585	98.0	738	123.6
Denmark.....	790	690	87.3	691	70.1	657	83.2
Estonia.....	309	425	137.5	409	132.1	525	169.9
Switzerland.....	165	172	104.2	182	110.3	201	121.8
Norway.....	49	46	93.9	46	93.9	61	124.5
Total.....	116,516	103,833	91.3	114,635	98.4	116,493	100.0

† Exclusive of British Isles.

Compiled by Foreign Agricultural Service Division.

TABLE 81.—Percentage that wheat acreage is of total wheat and rye acreage, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13	Average 1924-28	Average 1929-33	1934
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
British Isles.....		96.6	97.5	95.8
Italy.....	97.1	97.5	97.0	97.8
Greece.....	93.7	91.6	90.1	90.7
Rumania.....	88.1	91.9	89.2	89.3
Yugoslavia.....	84.5	89.8	89.5	89.1
France.....	84.2	86.8	88.2	88.7
Spain.....	82.8	85.7	88.0	88.4
Bulgaria.....	81.6	85.2	84.0	86.7
Switzerland.....	63.6	70.3	71.2	82.6
Portugal.....	81.7	65.7	76.0	78.2
Norway.....	24.5	52.2	63.0	75.4
Hungary.....	69.8	69.6	71.2	70.5
Sweden.....	20.7	37.0	55.2	56.2
Czechoslovakia.....	30.7	42.4	44.6	48.5
Netherlands.....	19.9	21.0	32.7	44.1
Denmark.....	10.5	32.0	42.4	42.9
Belgium.....	37.5	30.6	35.7	41.4
Austria.....	36.4	31.4	26.6	37.4
Latvia.....	8.7	16.0	36.8	32.0
Germany.....	21.1	26.0	33.7	30.7
Estonia.....	4.5	13.6	28.4	20.6
Lithuania.....	10.8	19.3	22.3	23.8
Poland.....	21.0	19.1	22.3	23.8
Finland.....	1.3	6.8	9.1	16.9
All countries †.....	60.9	62.1	63.7	65.0

† Exclusive of the British Isles.

Compiled by the Foreign Agricultural Service Division.

TABLE 82.—Wheat production in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13 production	Average 1924-28		Average 1929-33		1934	
		Production	Percentage of 1909-13	Production	Percentage of 1909-13	Production	Percentage of 1909-13
	1,000 bushels	1,000 bushels	Percent	1,000 bushels	Percent	1,000 bushels	Percent
France.....	325,644	280,140	86.0	305,066	93.7	338,513	104.0
Italy.....	184,398	211,208	114.6	258,016	139.9	233,036	126.4
Spain.....	130,446	130,687	107.1	181,563	116.2	173,000	133.1
Germany.....	131,271	112,991	86.1	161,515	123.0	165,541	126.9
Rumania.....	155,672	90,664	62.5	108,086	68.1	76,553	48.2
Poland.....	61,665	51,826	83.9	72,132	117.0	76,440	124.0
British Isles.....	59,640	53,572	89.8	48,348	81.1	73,559	123.4
Yugoslavia.....	22,624	73,541	118.0	84,828	136.8	68,328	110.2
Hungary.....	71,493	74,859	104.7	78,539	109.9	61,824	86.5
Czechoslovakia.....	37,879	42,209	111.7	54,280	143.3	50,014	132.0
Bulgaria.....	37,823	38,775	102.5	51,583	136.4	59,595	157.4
Greece.....	10,273	11,480	70.5	15,565	95.6	28,909	177.0
Sweden.....	8,194	13,183	162.8	22,513	277.8	38,370	350.2
Portugal.....	11,826	10,121	85.4	15,549	131.1	20,550	173.0
Netherlands.....	4,836	5,837	119.2	9,287	189.7	17,150	354.2
Belgium.....	15,199	14,755	97.1	14,141	93.1	14,322	94.2
Austria.....	12,813	10,605	83.5	12,277	95.8	13,239	103.3
Denmark.....	6,322	8,390	135.5	10,616	172.7	12,463	197.6
Lithuania.....	3,263	4,877	149.4	8,363	271.5	10,475	320.9
Latvia.....	1,475	2,145	145.4	4,301	295.7	8,051	545.8
Switzerland.....	3,314	3,904	117.7	4,131	124.7	5,071	153.0
Finland.....	137	911	668.9	1,339	977.4	3,377	2,392.0
Estonia.....	364	856	237.0	1,834	503.8	3,467	953.6
Norway.....	308	561	182.1	713	231.5	1,204	391.5
Total.....	1,345,269	1,270,180	94.4	1,495,400	111.2	1,527,136	113.5

Compiled by the Foreign Agricultural Service Division.

TABLE 83.—Rye production in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13 production	Average 1924-28		Average 1929-33		1934	
		Production	Percentage of 1909-13	Production	Percentage of 1909-13	Production	Percentage of 1909-13
	1,000 bushels	1,000 bushels	Percent	1,000 bushels	Percent	1,000 bushels	Percent
Germany.....	368,337	279,940	76.0	311,832	84.7	299,496	81.3
Poland.....	224,836	217,815	96.9	258,680	115.1	251,472	113.2
Czechoslovakia.....	63,538	58,148	91.5	72,960	114.9	59,068	94.4
France.....	52,501	36,403	69.3	22,717	43.3	32,983	62.8
Lithuania.....	24,263	19,625	80.8	21,700	89.6	20,331	83.8
Hungary.....	31,377	28,199	89.9	29,891	95.3	24,360	77.7
Austria.....	23,785	19,321	81.2	22,486	94.5	23,806	100.5
Spain.....	27,635	24,510	88.7	22,437	81.2	22,176	80.2
Belgium.....	23,644	21,498	90.9	21,449	90.7	20,802	88.0
Sweden.....	24,109	18,544	76.9	15,022	62.3	20,673	85.8
Netherlands.....	16,176	15,284	94.5	15,365	95.0	16,291	100.7
Latvia.....	13,061	9,004	68.9	11,053	84.6	16,210	124.1
Finland.....	10,490	12,148	115.8	12,743	121.5	15,582	148.5
Denmark.....	16,423	11,341	69.1	9,495	57.8	11,023	67.1
Estonia.....	8,129	5,880	72.3	7,263	89.3	9,064	111.5
Rumania.....	20,644	9,202	44.6	14,717	71.3	8,308	40.2
Yugoslavia.....	9,004	6,562	72.9	8,339	92.6	7,688	85.4
Bulgaria.....	8,315	6,722	80.6	9,865	118.2	6,576	78.8
Italy.....	6,317	6,357	100.8	6,522	103.2	5,607	88.8
Portugal.....	(2,300)	4,500	195.0	4,714	205.0	4,802	208.8
Greece.....	1,129	1,463	129.6	1,074	174.8	2,900	257.7
Switzerland.....	1,783	1,617	90.4	1,461	83.6	1,242	69.7
British Isles.....	(¹)	1,233	-----	806	-----	510	-----
Norway.....	973	600	61.7	486	49.9	395	40.6
Total.....	978,800	815,128	83.3	913,918	93.4	890,874	91.0

¹ Data not available.² Exclusive of British Isles.

Compiled by the Foreign Agricultural Service Division.

TABLE 84.—*Total production of wheat and rye in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934*

Country	Average 1909-13 production	Average 1924-28		Average 1929-33		1934	
		Production	Percent- age of 1909-13	Production	Percent- age of 1909-13	Production	Percent- age of 1909-13
	<i>1,000 bushels¹</i>	<i>1,000 bushels¹</i>	<i>Percent</i>	<i>1,000 bushels¹</i>	<i>Percent</i>	<i>1,000 bushels¹</i>	<i>Percent</i>
Germany.....	475,055	374,208	78.8	452,558	95.3	440,071	92.9
France.....	374,643	314,116	83.8	335,602	89.0	309,297	82.6
Poland.....	271,512	258,213	95.1	313,557	115.5	313,947	115.6
Italy.....	190,289	217,141	114.1	264,103	138.8	238,260	125.2
Spain.....	156,240	162,569	104.1	172,501	110.4	194,298	124.4
Czechoslovakia.....	97,181	96,580	99.4	122,404	126.0	105,184	108.1
Hungary.....	100,778	101,178	100.4	106,437	105.6	87,579	86.9
Rumania.....	177,940	108,253	60.8	121,822	68.5	84,307	47.4
Yugoslavia.....	70,428	79,946	113.5	92,611	131.5	75,503	107.2
British Isles.....		(54,723)		(49,100)		(74,045)	
Sweden.....	30,591	30,501	99.7	37,402	122.2	47,671	155.8
Bulgaria.....	45,612	45,019	98.8	60,791	133.3	45,733	100.3
Austria.....	35,010	38,728	110.6	32,984	94.2	35,542	101.5
Lithuania.....	25,928	23,194	89.5	20,172	77.8	35,051	135.2
Belgium.....	37,267	34,820	93.4	31,163	83.7	33,737	90.5
Netherlands.....	19,993	20,102	100.5	23,628	118.2	32,401	162.1
Greece.....	17,227	12,845	74.6	17,307	100.5	31,521	181.9
Portugal.....	13,907	14,329	102.4	19,940	143.3	24,985	178.5
Latvia.....	13,065	10,552	77.2	14,677	112.3	23,180	176.6
Denmark.....	21,649	19,785	91.4	19,778	91.4	22,781	105.2
Finland.....	9,928	12,270	123.7	13,234	133.3	17,820	179.5
Estonia.....	7,951	6,354	79.9	8,608	108.3	11,567	145.5
Switzerland.....	4,078	5,438	133.3	5,523	135.4	6,230	152.8
Norway.....	1,214	1,151	95.1	1,167	96.1	1,573	129.6
Total.....	2,199,183	1,977,394	89.9	2,300,102	104.6	2,285,050	103.9

¹ Bushels of 60 pounds each.² Exclusive of British Isles.

Compiled by the Foreign Agricultural Service Division.

TABLE 85.—*Percentage that wheat production is of total wheat and rye production in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934*

Country	Average 1909-13	Average 1924-28	Average 1929-33	1934
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
British Isles.....		97.9	98.5	99.4
Italy.....	96.9	97.3	97.7	97.6
France.....	86.9	80.2	90.9	91.7
Greece.....	93.9	86.4	89.4	91.4
Rumania.....	80.2	92.1	88.7	90.8
Yugoslavia.....	88.1	92.0	91.6	90.5
Spain.....	83.5	85.9	87.9	89.3
Bulgaria.....	82.9	86.1	81.9	86.6
Portugal.....	84.7	70.6	77.9	82.1
Switzerland.....	66.6	71.7	74.8	81.4
Norway.....	25.2	31.5	61.1	76.5
Hungary.....	70.9	74.0	73.8	74.0
Sweden.....	26.5	43.3	60.2	59.5
Denmark.....	29.2	46.5	55.2	54.8
Netherlands.....	21.5	29.0	39.3	53.1
Czechoslovakia.....	30.0	43.8	41.3	47.2
Belgium.....	40.8	42.4	41.4	42.5
Germany.....	27.6	30.2	35.7	37.3
Austria.....	36.6	37.2	37.2	37.2
Latvia.....	10.8	20.4	29.7	34.7
Lithuania.....	12.6	21.0	20.2	29.0
Estonia.....	4.6	13.6	21.3	26.9
Poland.....	22.7	21.2	23.0	24.3
Finland.....	1.4	7.7	10.1	18.4
All countries ¹	58.5	61.5	62.9	63.6

¹ Exclusive of British Isles.

Compiled by the Foreign Agricultural Service Division.

TABLE 86.—Yield of wheat per acre in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13 yield	Average 1924-28		Average 1929-33		1934	
		Yield	Percent- age of 1909-13	Yield	Percent- age of 1909-13	Yield	Percent- age of 1909-13
	<i>Bushels</i>	<i>Bushels</i>	<i>Percent</i>	<i>Bushels</i>	<i>Percent</i>	<i>Bushels</i>	<i>Percent</i>
Netherlands.....	35.5	42.6	120.0	43.0	121.1	47.9	134.0
Denmark.....	41.1	40.0	90.5	42.8	104.1	44.3	107.8
Sweden.....	31.8	30.2	95.0	32.6	102.5	30.5	95.2
British Isles.....	31.0	33.0	104.4	33.2	105.1	37.5	118.7
Belgium.....	37.6	39.7	105.6	37.1	98.7	37.2	98.9
Germany.....	32.8	28.2	86.5	32.2	98.3	30.7	94.2
Switzerland.....	31.6	32.2	101.9	30.6	96.5	30.5	96.5
Norway.....	25.5	21.8	87.3	24.6	96.9	26.2	102.7
Finland.....	17.1	24.0	134.5	25.3	148.0	26.2	153.2
France.....	19.7	21.1	107.1	23.0	116.8	23.3	118.4
Austria.....	20.2	21.5	106.4	23.5	116.3	24.3	115.3
Latvia.....	17.4	16.4	94.3	19.7	113.2	22.0	131.6
Czechoslovakia.....	22.0	24.6	111.8	26.2	119.1	21.7	98.0
Estonia.....	15.5	16.5	106.5	18.5	119.4	20.4	131.6
Italy.....	15.8	14.9	94.3	16.5	104.4	19.3	122.2
Poland.....	15.6	17.7	113.5	21.4	137.2	19.0	121.8
Hungary.....	18.4	17.0	92.4	17.6	95.7	17.4	94.6
Spain.....	19.3	19.8	102.6	20.0	103.6	17.1	88.6
Greece.....	13.7	13.1	95.6	13.7	100.0	13.6	133.9
Portugal.....	11.4	9.3	81.6	10.6	73.6	14.5	109.7
Yugoslavia.....	9.8	9.5	96.9	12.3	125.5	14.1	143.9
Bulgaria.....	15.6	16.8	107.7	16.4	105.1	13.7	87.8
Romania.....	15.7	14.8	94.3	17.3	110.2	12.7	80.9
Rumania.....	10.7	12.5	114.9	14.3	85.6	10.1	60.5
All countries.....	18.5	18.2	98.4	20.1	108.6	19.7	106.5

Compiled by the Foreign Agricultural Service Division.

TABLE 87.—Yield of rye per acre in 24 European countries, average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13 yield	Average 1924-28		Average 1929-33		1934	
		Yield	Percent- age of 1909-13	Yield	Percent- age of 1909-13	Yield	Percent- age of 1909-13
	<i>Bushels</i>	<i>Bushels</i>	<i>Percent</i>	<i>Bushels</i>	<i>Percent</i>	<i>Bushels</i>	<i>Percent</i>
Belgium.....	35.2	37.9	107.7	38.2	108.5	38.2	108.5
Netherlands.....	20.0	31.3	157.0	34.5	172.5	36.2	181.0
Switzerland.....	20.7	32.3	156.0	31.7	153.1	35.5	171.5
Sweden.....	24.7	24.9	100.8	28.5	115.4	35.5	143.7
Germany.....	25.8	24.4	94.6	27.4	106.2	29.4	114.0
Norway.....	20.0	21.6	84.8	27.7	95.5	27.0	93.1
Finland.....	26.3	27.3	103.8	28.6	108.7	26.3	100.0
Austria.....	17.8	21.5	120.8	24.0	134.8	25.4	142.7
Estonia.....	21.4	20.4	95.3	23.0	107.5	25.2	117.8
Czechoslovakia.....	16.7	16.0	95.8	20.3	121.6	21.9	131.2
Latvia.....	21.4	25.0	116.8	28.3	132.3	21.6	100.8
Lithuania.....	14.7	14.0	95.2	18.1	123.1	24.4	166.0
British Isles.....	13.9	15.9	114.4	18.0	129.5	21.5	154.7
Italy.....	21.6	21.6	100.0	21.2	98.1	21.3	98.6
France.....	18.3	20.7	113.1	22.0	120.2	20.2	110.4
Poland.....	17.0	18.0	106.0	18.4	108.2	19.5	114.7
Hungary.....	17.9	15.9	88.8	18.1	101.1	18.2	101.7
Spain.....	10.5	17.4	87.7	18.8	96.4	15.4	79.0
Greece.....	13.9	13.8	98.5	14.8	106.5	15.3	110.1
Bulgaria.....	14.9	12.9	86.6	12.2	81.9	14.3	95.0
Yugoslavia.....	13.4	14.7	95.5	17.3	112.3	13.8	89.0
Portugal.....	12.3	13.8	112.2	13.7	111.4	12.5	101.6
Romania.....	8.5	8.1	95.3	11.8	138.8	11.8	138.8
Rumania.....	10.1	13.2	82.0	16.1	100.0	9.1	50.5
All countries.....	21.6	19.6	91.2	22.0	102.3	21.7	100.9

Exclusive of British Isles.

Compiled by the Foreign Agricultural Service Division.

TABLE 88.—Percentage that wheat yield per acre is of rye yield per acre in 24 European countries,¹ average 1909-13, 1924-28, 1929-33, annual 1934

Country	Average 1909-13	Average 1924-28	Average 1929-33	1934
	Percent	Percent	Percent	Percent
British Isles	(2)	163.4	167.7	158.4
Denmark	170.5	170.4	167.2	161.7
Netherlands	131.0	145.9	133.5	141.7
France	123.9	125.6	133.7	130.0
Portugal	121.1	126.3	111.8	128.2
Germany	120.3	122.6	124.3	121.8
Sweden	137.7	130.2	122.6	130.5
Hungary	106.0	122.5	114.9	118.8
Rumania	111.3	101.6	95.3	118.8
Yugoslavia	135.7	130.2	128.1	117.1
Finland	103.0	114.4	112.9	110.5
Spain	103.4	101.6	92.3	109.1
Greece	103.0	77.5	93.0	109.0
Norway	104.1	97.3	92.9	105.0
Belgium	114.3	112.1	103.9	104.2
Poland	110.2	114.9	104.1	102.4
Lithuania	119.2	111.5	110.1	101.5
Italy	91.2	91.7	101.4	100.5
Latvia	127.0	125.2	116.6	100.4
Austria	101.0	113.2	103.8	99.1
Bulgaria	103.0	108.0	107.5	98.1
Czechoslovakia	96.5	105.6	90.2	91.8
Switzerland	113.1	107.0	103.4	92.1
Estonia	101.3	100.0	87.5	83.2
Weighted average ³	90.0	97.3	96.6	95.1

¹ Calculated on weight basis.² Data not available.³ British Isles excluded.

Compiled by the Foreign Agricultural Service Division.

TABLE 89.—Apparent utilization¹ of wheat in 24 European countries, average 1909-13, 1924-28, 1929-33

Country	Average 1909-13		Average 1924-28			Average 1929-33		
	Total	Per capita	Total	Per capita	Percentage total is of 1909-13	Total	Per capita	Percentage total is of 1909-13
	1,000 bushels	Bushels	1,000 bushels	Bushels	Percent	1,000 bushels	Bushels	Percent
France	369,203	8.3	326,605	8.0	88.5	345,729	8.3	93.6
Italy	237,187	6.8	295,907	7.3	124.8	291,412	7.1	123.1
British Isles	275,378	6.1	273,365	6.3	101.4	287,400	5.8	101.4
Germany	199,349	3.0	180,182	3.0	91.9	184,921	2.9	92.8
Spain	136,384	6.8	143,287	6.3	105.0	151,616	6.5	113.4
Rumania	—	—	93,708	5.5	—	97,001	5.3	—
Yugoslavia	—	—	65,540	5.0	—	75,698	5.4	—
Poland	—	—	61,127	2.1	—	70,122	2.2	—
Czechoslovakia	—	—	62,651	4.4	—	69,833	4.5	—
Belgium	—	—	56,086	7.0	83.8	57,643	7.1	87.2
Hungary	—	—	54,691	6.5	184.8	57,635	6.6	191.8
Bulgaria	—	—	36,501	6.8	—	47,014	8.0	—
Netherlands	—	—	31,130	4.5	135.7	38,713	4.8	142.5
Greece	—	—	31,844	4.2	—	35,761	5.5	—
Sweden	15,160	2.7	21,005	3.5	139.1	27,429	4.5	180.9
Austria	—	—	20,405	4.0	—	26,921	4.0	—
Denmark	12,880	4.7	18,515	5.4	113.5	23,956	6.4	178.0
Switzerland	20,247	5.4	10,850	5.0	112.0	22,785	5.6	112.6
Portugal	14,862	2.6	18,775	2.6	90.5	19,247	2.8	120.5
Norway	3,980	1.7	7,230	2.6	181.7	8,930	3.2	224.4
Lithuania	—	—	4,806	2.2	—	8,630	3.6	—
Finland	5,619	1.6	6,060	1.7	119.8	5,955	1.6	117.9
Latvia	—	—	4,044	2.2	—	5,421	2.8	—
Estonia	—	—	1,843	1.7	—	2,358	2.1	—
Total	—	—	1,856,790	5.1	—	1,904,216	5.2	—

¹ Production plus imports less exports.

Compiled by Foreign Agricultural Service Division.

TABLE 90.—*Apparent utilization¹ of rye in 24 European countries, average 1909-13, 1924-28, 1929-33*

Country	Average 1909-13		Average 1924-28			Average 1929-33		
	Total	Per capita	Total	Per capita	Percentage total is of 1909-13	Total	Per capita	Percentage total is of 1909-13
	<i>1,000 bushels</i>	<i>Bushels</i>	<i>1,000 bushels</i>	<i>Bushels</i>	<i>Percent</i>	<i>1,000 bushels</i>	<i>Bushels</i>	<i>Percent</i>
Germany.....	340,627	5.2	284,677	4.5	83.6	310,477	4.8	91.1
Poland.....			216,797	7.3		211,575	7.7	
Czechoslovakia.....			61,073	4.5		73,825	5.0	
France.....	58,810	1.4	37,987	.9	68.1	31,579	.8	62.0
Belgium.....	28,509	3.8	22,817	2.9	79.9	26,388	3.2	92.4
Hungary.....			21,702	2.6		25,600	2.9	
Austria.....			23,062	3.0		25,028	3.7	
Netherlands.....	27,843	4.8	19,037	2.5	68.3	23,151	2.9	83.1
Spain.....	27,630	1.4	24,510	1.1	88.7	22,437	.9	81.1
Lithuania.....			19,623	8.7		21,760	9.0	
Denmark.....	24,887	9.0	18,255	5.3	73.4	19,953	5.6	80.3
Sweden.....	27,981	3.0	21,137	3.5	75.5	17,579	2.0	62.8
Finland.....			18,291	5.1		16,079	4.4	
Rumania.....			8,116	.5		13,510	.4	
Latvia.....			11,703	0.3		11,063	0.2	
Bulgaria.....			6,232	1.1		8,971	1.6	
Yugoslavia.....			6,653	.5		8,327	.6	
Estonia.....			7,703	6.9		8,088	7.2	
Italy.....	6,939	.2	6,553	.2	94.0	7,133	.2	102.4
Norway.....	11,866	4.9	7,785	2.8	67.3	6,330	2.2	51.8
Portugal.....	(2,360)	.4	4,509	.7	190.0	4,714	.7	203.0
Greece.....			1,463	.2		1,974	.3	
Switzerland.....	2,510	.7	1,686	.1	67.2	1,815	.4	72.3
British Isles.....			2,070	.04		1,311	.03	
Total.....			857,162	2.1		936,615	2.5	

¹ Production plus imports less exports.

Compiled by Foreign Agricultural Service Division.

TABLE 91.—*Total utilization¹ of wheat and rye in 24 European countries, average 1909-13, 1924-28, and 1929-33*

Country	Average 1909-13 utilization	Average 1924-28		Average 1929-33	
		Utilization	Percentage of 1909-13	Utilization	Percentage of 1909-13
	<i>1,000 bushels²</i>	<i>1,000 bushels²</i>	<i>Percent</i>	<i>1,000 bushels²</i>	<i>Percent</i>
Germany.....	517,208	454,882	87.9	474,703	91.8
France.....	421,352	362,150	85.9	378,003	89.7
Italy.....	243,691	302,083	124.0	304,069	123.5
Poland.....		263,443		298,302	
British Isles.....		281,297		288,555	
Spain.....	162,178	166,130	102.4	175,557	108.2
Czechoslovakia.....		122,462		135,735	
Rumania.....		101,283		109,619	
Yugoslavia.....		71,749		83,470	
Belgium.....	92,775	76,382	82.3	82,272	88.7
Hungary.....		75,030		81,528	
Netherlands.....	53,150	51,598	97.6	60,321	113.5
Bulgaria.....		42,678		58,309	
Austria.....		48,490		50,250	
Sweden.....	41,276	40,523	98.9	43,536	106.2
Denmark.....	36,198	35,556	98.5	41,087	115.5
Greece.....		33,209		37,603	
Lithuania.....		23,183		28,939	
Switzerland.....	22,880	24,424	91.9	24,379	108.4
Portugal.....	17,009	20,983	123.4	23,647	139.0
Finland.....		23,122		20,962	
Latvia.....		15,023		16,586	
Norway.....	14,775	14,499	98.1	14,816	100.5
Estonia.....		9,032		9,907	
Total.....		2,656,810		2,837,386	

¹ Production plus imports less exports.² Bushels of 60 pounds each.

Compiled by the Foreign Agricultural Service Division.

TABLE 92.—*Apparent per capita utilization¹ of wheat and rye in 24 European countries, average 1909-13, 1924-28, and 1929-33*

Country	Wheat average			Rye average			Total ² average		
	1909-13	1924-28	1929-33	1909-13	1924-28	1929-33	1909-13	1924-28	1929-33
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
France.....	558	480	498	78	50	45	636	530	543
Bulgaria.....		408	480		62	81		470	564
Belgium.....	531	420	426	213	162	179	744	582	605
Italy.....	408	438	420	11	11	11	419	449	437
Hungary.....		390	396		146	162		536	558
Spain.....	408	378	390	78	62	50	486	440	440
Denmark.....	282	224	281	504	297	314	786	621	695
British Isles.....	360	318	318		2	2		360	360
Switzerland.....	324	360	336	39	22	22	363	322	358
Greece.....		312	330		11	17		323	347
Yugoslavia.....		300	324		25	31		328	358
Rumania.....		330	318		28	34		358	352
Netherlands.....	276	270	288	269	140	162	545	410	450
Czechoslovakia.....		261	270		252	263		516	533
Sweden.....	162	210	270	280	166	162	442	466	432
Austria.....		240	240		202	207		442	447
Lithuania.....		132	216		487	501		640	720
Norway.....	102	156	192	274	157	123	376	313	315
Germany.....	180	180	174	291	262	269	471	432	443
Latvia.....		132	168		373	317		485	515
Portugal.....	150	156	168	22	39	39	172	195	207
Poland.....		120	132		409	431		535	563
Estonia.....		102	126		386	403		488	529
Finland.....	96	102	90		286	246		388	342
Average.....		307	312		132	139		439	451

¹ Based on production plus imports less exports.² Wheat converted on basis of 60 pounds per bushel and rye on basis of 56 pounds per bushel.

Compiled by the Foreign Agricultural Service Division.

TABLE 93.—*Percentage that wheat utilization¹ is of total wheat and rye utilization¹ in 24 European countries, average 1909-13, 1924-28, 1929-33*

Country	Average 1909-13	Average 1924-28	Average 1929-33	Country	Average 1909-13	Average 1924-28	Average 1929-33
	Percent	Percent	Percent		Percent	Percent	Percent
British Isles.....	(?)	99.3	99.6	Sweden.....	36.7	51.7	62.6
Italy.....	97.3	98.0	97.8	Norway.....	26.9	49.9	60.2
Greece.....	(?)	95.9	95.1	Denmark.....	35.7	32.1	53.3
Switzerland.....	89.6	92.7	93.1	Austria.....	(?)	51.5	53.5
France.....	87.6	90.2	91.5	Czechoslovakia.....	(?)	51.2	50.7
Yugoslavia.....	(?)	91.3	90.7	Germany.....	38.5	41.6	39.0
Rumania.....	(?)	92.5	88.5	Latvia.....	(?)	26.0	32.7
Spain.....	81.4	86.2	88.1	Lithuania.....	(?)	21.0	29.8
Bulgaria.....	(?)	86.4	81.9	Finland.....	(?)	26.2	28.4
Portugal.....	87.4	79.9	81.4	Estonia.....	(?)	20.4	23.8
Hungary.....		72.9	70.7	Poland.....	(?)	23.2	23.5
Belgium.....	71.3	72.1	70.1				
Netherlands.....	51.1	55.8	61.2	All countries.....		69.9	69.2

¹ Production plus imports less exports.² Data not available.

Compiled by the Foreign Agricultural Service Division.

TABLE 94.—Imports of wheat and wheat flour into 24 European countries, average 1909-13, 1924-28, and 1929-33

Country	Wheat			Flour ¹			Total		
	Average, 1909-13	Average, 1924-28	Average, 1929-33	Average, 1909-13	Average, 1924-28	Average, 1929-33	Average, 1909-13	Average, 1924-28	Average, 1929-33
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
British Isles.....	192,363	205,712	216,449	27,110	33,048	32,807	219,473	238,760	249,146
France.....	44,261	47,100	54,223	558	483	1,203	44,822	47,643	55,426
Belgium.....	(2)	42,624	46,576	(2)	895	555	72,577	43,510	47,141
Italy.....	(2)	87,657	41,119	(2)	241	502	50,431	87,208	42,011
Germany.....	90,539	77,731	38,432	800	9,594	630	91,339	87,225	39,042
Netherlands.....	70,574	22,018	26,315	10,128	7,068	4,260	80,702	29,076	30,575
Greece.....	(2)	15,576	19,823	(2)	4,788	373	(2)	20,364	20,196
Switzerland.....	16,937	15,910	18,668	(2)	(2)	(2)	16,937	15,910	18,668
Czechoslovakia.....	(2)	9,217	12,273	(2)	11,372	3,565	(2)	20,589	15,838
Austria.....	(2)	8,516	10,185	(2)	7,334	4,577	(2)	15,894	14,762
Denmark.....	(2)	7,076	9,605	(2)	2,864	2,635	7,125	9,940	12,240
Norway.....	800	6,358	5,312	2,874	3,178	2,905	6,374	6,636	8,217
Sweden.....	(2)	8,737	5,128	(2)	776	242	7,680	9,513	5,370
Finland.....	(2)	14	801	(2)	5,095	3,812	4,912	5,109	4,616
Portugal.....	3,228	6,172	3,251	0	485	456	3,228	6,657	3,710
Spain.....	(2)	4,187	3,155	(2)	(2)	(2)	6,009	4,107	3,155
Latvia.....	(2)	1,005	1,111	(2)	10	2	(2)	1,915	1,113
Poland.....	(2)	4,184	505	(2)	3,370	31	(2)	7,554	626
Estonia.....	(2)	591	410	(2)	286	114	(2)	977	521
Bulgaria.....	(2)	(2)	399	(2)	(2)	0	(2)	(2)	390
Rumania.....	(2)	131	25	(2)	58	1	(2)	492	26
Hungary.....	(2)	212	1	(2)	2	1	(2)	214	2
Lithuania.....	(2)	7	2	(2)	0	0	(2)	7	2
Yugoslavia.....	0	0	0	0	0	0	0	0	0
Total ²		568,517	513,775		91,937	58,631		659,454	572,406

¹ In terms of grain on basis of 4.5 bushels of grain per barrel of flour.² Given in total. Separate data for wheat and flour not available.³ Data not available.⁴ None reported.⁵ Season 1913-14.⁶ Net imports.⁷ Less than 500 bushels.⁸ Figures are somewhat incomplete since imports in 1928-29 are available for 7 months only.⁹ Exclusive of Bulgaria.

Compiled by the Foreign Agricultural Service Division.

TABLE 95.—Imports of rye and rye flour¹ into 24 European countries, average 1909-13, 1924-28, and 1929-33

Country	Imports ¹			Country	Imports ¹		
	Average, 1909-13	Average, 1924-28	Average, 1929-33		Average, 1909-13	Average, 1924-28	Average, 1929-33
	1,000 bushels	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels
Denmark.....	8,753	7,356	10,831	British Isles.....	(2)	945	520
Germany.....	16,226	17,220	9,023	Switzerland.....	728	39	324
Netherlands.....	29,557	4,812	8,322	Poland.....	(2)	2,982	213
Norway.....	10,641	7,188	5,853	Yugoslavia.....	(2)	5	1
Belgium.....	5,755	1,529	5,358	Hungary.....	(2)	3	(2)
Finland.....	(2)	6,153	3,338	Bulgaria.....	(2)	(2)	(2)
Austria.....	(2)	4,430	2,914	Greece.....			
Czechoslovakia.....	(2)	6,347	2,290	Lithuania.....			
France.....	3,320	1,708	1,860	Portugal.....			
Sweden.....	3,940	3,126	1,690	Rumania.....	(2)	10	
Latvia.....	(2)	2,812	913	Spain.....			
Estonia.....	(2)	1,823	530				
Italy.....	654	276	612	Total		68,745	51,850

¹ Flour included, converted on the basis of 6 bushels of grain per barrel of flour.² Data not available.³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division.

TABLE 96.—Exports of wheat and wheat flour from 24 European countries, average 1909-13, 1924-28, and 1929-33

Country	Wheat			Flour ¹			Total		
	Average 1909-13	Average 1924-28	Average 1929-33	Average 1909-13	Average 1924-28	Average 1929-33	Average 1909-13	Average 1924-28	Average 1929-33
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Hungary.....	(2)	11,182	13,229	(2)	9,200	0,677	(2)	20,382	20,100
Germany.....	14,245	8,153	11,547	0,019	3,000	4,050	23,264	11,133	15,633
France.....	49	233	3,753	1,164	855	11,010	1,203	1,088	14,763
Rumania.....	(2)	3,452	10,550	(2)	2,496	(2)	(2)	6,438	11,108
British Isles.....	(2)	(2)	(2)	3,736	12,967	10,064	3,736	12,967	10,061
Yugoslavia.....	(2)	6,133	8,814	(2)	1,308	316	(2)	8,031	9,130
Italy.....	(2)	12	21	(2)	2,358	5,501	3,637	2,539	5,615
Bulgaria.....	(2)	998	4,452	(2)	916	517	(2)	1,914	4,969
Belgium.....	(2)	1,050	3,329	(2)	2,138	313	21,965	3,188	3,642
Czechoslovakia.....	(2)	12	43	(2)	235	3,212	(2)	247	3,285
Poland.....	(2)	1,149	1,831	(2)	104	822	(2)	1,253	2,650
Netherlands.....	67,433	371	918	1,002	1,300	201	68,435	1,674	1,149
Sweden.....	(2)	1,275	408	(2)	336	40	(2)	1,611	454
Lithuania.....	(2)	(2)	207	(2)	(2)	28	(2)	18	235
Denmark.....	(2)	421	74	(2)	201	16	597	622	120
Austria.....	(2)	88	76	(2)	72	42	(2)	130	118
Spain.....	(2)	6	6	(2)	621	60	(2)	627	102
Latvia.....	(2)	(2)	1	(2)	(2)	52	(2)	19	53
Switzerland.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	11
Portugal.....	(2)	(2)	(2)	216	3	3	216	3	3
Norway.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Greece.....	0	0	0	0	0	0	0	0	0
Estonia.....	0	0	0	0	0	0	0	0	0
Finland.....	0	0	0	0	0	0	0	0	0
Total.....		35,417	60,160		38,300	43,617		73,837	103,747

¹ In terms of grain on basis of 4.5 bushels per barrel of flour.² Data not available.³ No exports of wheat are reported except re-exports which have been deducted from imports.⁴ Given in total. Separate data for wheat and flour are not available.⁵ Less than 500 bushels.⁶ Foreign trade in wheat and flour reported only as net imports.⁷ Exclusive of Estonia, Finland, Greece, Latvia, Lithuania, Norway, and Switzerland.

Compiled by the Foreign Agricultural Service Division.

TABLE 97.—Exports¹ of rye and rye flour from 24 European countries, average 1909-13, 1924-28, and 1929-33

Country	Average 1909-13	Average 1924-28	Average 1929-33	Country	Average 1909-13	Average 1924-28	Average 1929-33
	1,000 bushels	1,000 bushels	1,000 bushels		1,000 bushels	1,000 bushels	1,000 bushels
Poland.....	(2)	4,111	14,318	France.....	20	124	7
Germany.....	43,836	12,483	10,378	Finland.....	(2)	10	4
Hungary.....	(2)	6,110	4,241	Latvia.....	(2)	53	3
Czechoslovakia.....	(2)	422	1,461	Italy.....	2	80	1
Rumania.....	(2)	1,096	1,201	Switzerland.....	1	(2)	(2)
Bulgaria.....	(2)	499	891	Estonia.....			
Netherlands.....	17,889	1,069	530	Greece.....			
Belgium.....	830	210	419	Lithuania.....			
Denmark.....	245	442	343	Norway.....	51	0	0
Austria.....	(2)	89	72	Portugal.....			
Sweden.....	59	533	42	Spain.....			
British Isles.....	(2)	108	15				
Yugoslavia.....	(2)	214	13				
				Total.....		37,911	53,998

¹ Flour included, converted on the basis of 6 bushels of grain per barrel of flour.² Data not available.³ Less than 500 bushels.

Compiled by the Foreign Agricultural Service Division.

TABLE 98.—Wheat-production deficit, or surplus, in 24 countries of Europe, average 1909-13, 1924-28, and 1929-33

[Annual production deficit (—) or surplus (+)]

Country	Average 1909-13		Average 1924-28		Average 1929-33	
	1,000 bushels	Percent	1,000 bushels	Percent	1,000 bushels	Percent
British Isles.....	-215,738	-78.3	-225,793	-80.8	-230,052	-83.2
Belgium.....	-50,912	-77.0	-40,331	-73.2	-43,309	-75.5
France.....	-43,619	-11.8	-48,555	-14.3	-40,653	-11.8
Italy.....	-52,791	-22.3	-54,759	-28.6	-36,398	-12.4
Netherlands.....	-22,267	-82.0	-28,302	-82.9	-29,426	-78.0
Germany.....	-68,075	-34.1	-70,192	-40.3	-23,400	-12.7
Greece.....	(0)		-20,364	-63.9	-20,100	-50.7
Switzerland.....	-10,923	-83.6	-15,910	-80.3	-18,051	-81.9
Austria.....	(0)		-15,710	-59.5	-14,614	-61.4
Czechoslovakia.....	(0)		-20,312	-32.5	-12,653	-18.8
Denmark.....	-6,568	-20.9	-9,318	-50.3	-12,126	-52.6
Norway.....	-3,674	-92.3	-0,636	-91.8	-8,217	-92.0
Sweden.....	-7,057	-46.6	-7,902	-37.5	-4,916	-17.9
Finland.....	-4,912	-67.3	-5,169	-84.4	-4,610	-77.5
Portugal.....	-3,012	-20.3	-0,451	-39.7	-3,707	-10.3
Spain.....	-5,938	-6.4	-3,670	-2.5	-3,053	-2.0
Latvia.....	(0)		-1,806	-46.9	-1,060	-10.8
Estonia.....	(0)		-977	-53.0	-524	-22.2
Lithuania.....	(0)		+11	+2	+253	+2.7
Poland.....	(0)		-0,301	-10.3	+2,030	+2.9
Bulgaria.....	(0)		+1,914	+5.2	+4,570	+9.7
Yugoslavia.....	(0)		+8,001	+12.2	+9,130	+12.1
Rumania.....	(0)		+5,961	+6.4	+11,051	+11.4
Hungary.....	(0)		+29,168	+39.9	+20,901	+20.3
Total deficits.....			-623,690		-516,765	
Total surpluses.....			+30,055		+47,940	

* No data available.

Compiled by Foreign Agricultural Service Division.

TABLE 99.—Rye-production deficit, or surplus, in 24 specified countries of Europe, average 1909-13, 1924-28, and 1929-33

[Annual production deficit (—) or surplus (+)]

Country	Average 1909-13		Average 1924-28		Average 1929-33	
	1,000 bushels	Percent	1,000 bushels	Percent	1,000 bushels	Percent
Denmark.....	-8,365	-34.0	-6,914	-37.9	-10,488	-52.5
Netherlands.....	-11,668	-41.9	-3,743	-19.7	-7,780	-33.6
Norway.....	-10,323	-91.6	-7,188	-92.3	-5,853	-62.3
Belgium.....	-4,925	-17.2	-1,819	-5.8	-4,939	-18.7
Finland.....	(0)		-0,343	-33.6	-3,334	-20.7
Austria.....	(0)		-4,341	-18.3	-2,842	-11.4
France.....	-3,309	-5.9	-1,554	-4.2	-1,862	-5.4
Sweden.....	-3,881	-13.9	-2,593	-12.3	-1,027	-9.3
Latvia.....	(0)		-2,759	-23.5	-940	-7.6
Czechoslovakia.....	(0)		-5,925	-0.2	-835	-1.1
Estonia.....	(0)		-1,823	-23.7	-830	-10.3
Italy.....	-652	-9.4	-196	-3.0	-611	-8.6
British Isles.....	(0)		-837	-10.4	-595	-38.5
Switzerland.....	-728	-29.0	-79	-2.8	-324	-17.9
Greece.....	(0)		0	0	0	0
Lithuania.....	(0)		0	0	0	0
Portugal.....	0	0	0	0	0	0
Spain.....	0	0	0	0	0	0
Yugoslavia.....	(0)		+299	+3.1	+42	+0.1
Bulgaria.....	(0)		+199	+7.9	+801	+8.9
Rumania.....	(0)		+1,086	+13.4	+1,301	+9.9
Germany.....	+27,710	+8.1	+5,737	+1.7	+1,355	+0.4
Hungary.....	(0)		+0,407	+0.4	+4,231	+10.8
Poland.....	(0)		+1,148	+0.5	+14,103	+5.8
Total deficits.....			-59,131		-42,749	
Total surpluses.....			+9,340		+21,955	

* No data available.

Compiled by the Foreign Agricultural Service Division.

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